

**Harmonized system of quality
assessment for electronic components**

**Generic specification:
Discrete pressure
contact power
semiconductor devices
(Qualification
approval)**

The European Standard EN 153000:1998 has the status of a
British Standard

ICS 31.080.01

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National foreword

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- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
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The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 24 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Amendments issued since publication

Amd. No.	Date	Comments

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 July 1998

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ISBN 0 580 30206 7

Contents

	Page
National foreword	Inside front cover
Foreword	2
Text of EN 153000	3

English version

Generic specification:
Discrete pressure contact power semiconductor devices
(Qualification approval)

Fachgrundspezifikation:
Druckkontakt-Einzel-
Leistungshalbleiterbauelemente
(Befähigungsanerkennung)

This European Standard was approved by CENELEC on 1995-11-28. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This European Standard was prepared by CECC Working Group 7 “Rectifier diodes and thyristors”. In the absence of a current chairman or secretary of CECC Working Group 7, this specification was submitted to the CECC by the UK ONH under the Single Originator Procedure. It is based whenever possible on the publications of International Electrotechnical Commission (IEC) and in particular on those referred to under “Related Documents”.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 153000 on 1995-11-28.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1998-11-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1998-11-01

Contents

	Page
1 General	3
2 Quality assessment procedures	5
3 Test and measurement procedures (general guidance)	8
Annex A General inspection requirements for rectifier diodes and thyristors	14
Annex B Additional electrical test methods	17
Annex C Screening	20
Annex D Dimensions	23
Annex E Direction of applied forces for mechanical tests	23
Figure 1 — Test arrangement for reverse-bias test of bipolar transistor	13
Figure B.1 — Test set-up for verifying second breakdown current rating I_{SB}	17
Figure B.2 Test set-up for verifying the collector-emitter sustaining voltage $V_{CEO\ SUS}$ of a transistor	19
Figure B.3 — Current-voltage cycle for Method T-011	19
Figure D.1 — Double-sided button device	23
Figure D.2 — Stud mounted device	23
Figure E.1 — Axes defining the direction of applied force: button devices	24
Figure E.2 — Axes defining the direction of applied force: cylindrical devices	24
Table C.1 — Screening sequences	21

1 General

1.1 Scope

This document applies to discrete pressure contact power semiconductor devices namely rectifier diodes, transistors, thyristors and their derivatives. The requirements also cover encapsulated assemblies. The document does not apply to stacks or assemblies made with these encapsulated components.

1.2 Related documents

CECC 00 007, *Basic specification: Sampling plans and procedures for inspection attributes.*

CECC 00 111, *RP 11: Specifications.*

EN 100114-1, *Rule of procedure — Quality Assessment Procedures — Part 1: CECC requirements for the approval of an organization.*

EN 100114-2, *Part 2: CECC requirements for the qualification approval, the release for delivery and the validity of release of electronic components.*

IEC 60027, *Letter symbols to be used in electrical technology (several parts).*

IEC 60050, *International Electrotechnical Vocabulary.*

IEC 60068, *Basic environmental testing procedures, namely.*

IEC 60068-1, *Part 1: General.*

IEC 60068-2-2, *Dry heat: Test Ba.*

IEC 60068-2-6, *Vibration (sinusoidal): Test Fc.*

IEC 60068-2-14, *Change of temperature: Tests Na, Nb and Nc.*

IEC 60068-2-17, *Sealing: Tests Qc, Qk and Ql.*

IEC 60148, *Letter symbols for semiconductor devices and integrated microcircuits.*

IEC 60191, *Mechanical standardization of semiconductor devices (several parts).*

IEC 60410, *Sampling plans and procedures for inspection of attributes (see also CECC 00 007).*

IEC 60617, *Graphical symbols for diagrams.*

IEC 60747-2, *Semiconductor devices and integrated circuits — Part 2: Rectifier diodes.*

IEC 60747-6, *Semiconductor devices and integrated circuits — Part 6: Thyristors.*

ISO 497, *Guide to the choice of series of preferred numbers and of series containing more rounded values of preferred numbers.*

ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units.*

ISO/R 2015, *Numbering of weeks*¹⁾.

1.3 Units, symbols and terminology

Units, graphical symbols, letter symbols and terminology shall, whenever possible, be taken from the following documents:

IEC 60027, *Letter symbols to be used in electrical technology.*

IEC 60050, *International electrotechnical vocabulary.*

IEC 60617, *Graphical symbols for diagrams.*

ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units.*

Any other units, symbols and terminology peculiar to one of the components covered by a generic specification, shall be taken from the relevant IEC or ISO documents, listed under “Related documents”.

1.4 Standard and preferred values

Ratings and characteristics shall be chosen from IEC 60747-2 and IEC 60747-6 at the time of producing the Detail Specification in conjunction with the customer requirements.

¹⁾ superseded by ISO 8601:1988: Data elements and interchange formats — information interchange — Representation of dates and times

1.5 Marking of component and package

The following shall be marked on the device, in the following order of precedence, as space permits. All the information, except the terminal marking, shall appear on the primary pack used as initial protection or wrapping for delivery:

- a) Terminal identification (1.5.1)
- b) Type designation (1.5.2)
- c) Date code (1.5.4) and/or:
factory identification code or manufacturer's name or trade-mark (1.5.3)
- d) Mark of Conformity unless a Certificate of Conformity is used

In addition, the primary pack shall be marked with the detail specification reference, followed by the letter defining the level of quality assessment (Annex A) and, if applicable, by the letter identifying the screening sequence (Annex C).

Example: EN 153 002-000 F-C.

The detail specification shall prescribe the information actually marked on the device.

1.5.1 Terminal identification

The terminals shall be identified in at least one of the following ways:

- in accordance with the specified outline or base drawing;
- in accordance with one of the methods given in 2.5.1.1, 2.5.1.2 or 2.5.1.3;
- as specified in the detail specification.

1.5.1.1 Diodes

Polarity of diodes shall be clearly indicated by one or more of the following methods:

- the rectifier arrow graphical symbol pointing towards the cathode;
- a colour code as follows:
Red shall be used for the cathode.
Black shall be used for the anode.

1.5.1.2 Transistors

When so specified in the detail specification, transistor terminals shall be identified by the following colour code:

Collector terminal	Red
Emitter terminal	Blue
Base terminal	Yellow

Fourth terminal if present:

- if connected to collector, emitter or base: the relevant colour of this electrode;
- if connected to anything else (for instance a shield): uncoded.

When it is appropriate to identify only one terminal, the collector shall be marked.

1.5.1.3 Thyristors

The thyristors terminals shall be indicated by one of the following methods:

- The thyristor graphical symbol with the arrow directed towards the cathode terminal.
- A colour code as follows:
Cathode terminal(s) Red; and/or
Anode terminal(s) Blue (or black)
Gate terminal(s) Yellow (or white).

1.5.2 Type designation

The type designation shall be given in letters and figures.

1.5.3 Manufacturer's name or trade-name

Where the certificate of conformity enables traceability to a manufacturer's factory, the manufacturer's name or trade-name is sufficient. In all other cases, the factory identification code shall be used.

1.5.4 Date code system

The date code system is as ISO/R 2015 for the week, preceded by the last two digits of the year (example: 9245 — 45th week of 1992).

1.6 Subcontracting

Subcontracting within the rules of EN 100114-2. subclause 1.2 is not permitted.

1.7 Validity of release

Release is valid for a period of 2 years. See 2.3.5 for the requirements for subsequent delivery.

2 Quality assessment procedures

2.1 General

The quality assessment tests are subdivided into Group A, Group B tests which are performed on each lot. Group C tests which are performed periodically and Group D tests which are performed for design proving only.

The following CECC ongoing product assessment procedure is designed to produce consistent high reliability power semiconductor devices and enable a manufacturer once approved (see EN 100114-1) to claim "Qualification Approval".

2.1.1 Manufacturing and system control

The company shall be audited to ensure that quality and manufacturing control systems are in place, based on EN 100114-1, which incorporates the requirements of EN ISO 9000.

2.1.2 Primary stage of manufacture

The primary stage for bipolar semiconductor devices is the first process which changes the monocrystalline semiconductor material from being wholly P-type or wholly N-type.

2.1.3 Definition of a production lot

Unless otherwise stated, a production or inspection lot (hereinafter referred to as "lot") shall consist of devices having structurally similar design, manufactured on the same production line, and normally assembled during a maximum of 6 weeks. (Maximum lot size 500 pieces).

2.1.4 Structurally similar components

The crucial criterion for grouping of types of devices as structurally similar is that the differences between the various types have no influence on the results of the test for which the group has been formed. Rotation within the group shall be performed to ensure all types are tested.

2.2 Qualification approval procedures

New product ranges shall be subject to groups A, B, C and D testing prior to approval being given. Approval shall consist of a review of the test data by the Chief Inspector and subsequent authorisation by him of approved status for that product range. Potential customers shall have this information made available to them on request as a Test Report. The Test Report shall consist of a listing of tests performed, conditions of testing, sample sizes and results of individual measurements before and after each test.