



IEC 60115-8

Edition 2.0 2009-01

INTERNATIONAL STANDARD

**Fixed resistors for use in electronic equipment –
Part 8: Sectional specification – Fixed surface mount resistors**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE



ICS 31.040.10

ISBN 2-8318-1023-9

CONTENTS

FOREWORD.....	4
1 General.....	6
1.1 Scope.....	6
1.2 Object.....	6
1.3 Normative references.....	6
1.4 Information to be specified in a detail specification.....	7
1.4.1 Outline drawing.....	7
1.4.2 Style and dimensions.....	7
1.4.3 Climatic category.....	7
1.4.4 Limits of resistance change after testing.....	7
1.4.5 Resistance range.....	7
1.4.6 Tolerances on nominal resistance.....	7
1.4.7 Temperature coefficient of resistance.....	7
1.4.8 Rated dissipation.....	7
1.4.9 Limiting element voltage.....	8
1.4.10 Insulation voltage.....	8
1.4.11 Insulation resistance.....	8
1.4.12 Marking.....	8
1.4.13 Ordering information.....	8
1.4.14 Mounting.....	8
1.5 Product classification.....	8
2 Preferred characteristics, ratings and test severities.....	9
2.1 Preferred characteristics.....	9
2.1.1 Style and dimensions.....	9
2.1.2 Preferred climatic categories.....	11
2.1.3 Variation of resistance with temperature.....	11
2.1.4 Limits for change in resistance.....	12
2.2 Preferred values of ratings.....	13
2.2.1 Resistance.....	13
2.2.2 Tolerances on resistance.....	13
2.2.3 Rated dissipation P_{70}	13
2.2.4 Limiting element voltage U_{max}	14
2.2.5 Insulation resistance.....	14
2.2.6 Insulation voltage.....	14
2.3 Preferred test severities.....	14
2.3.1 Short time overload.....	14
2.3.2 Solderability.....	15
2.3.3 Resistance to soldering heat.....	15
2.3.4 Shear (adhesion) test.....	16
2.3.5 Periodic pulse overload test.....	17
2.3.6 Resistance to electrostatic discharge (ESD).....	17
2.3.7 Component solvent resistance.....	18
2.3.8 Solvent resistance of marking.....	18
2.4 Preparation of specimen.....	18
2.4.1 Drying.....	18
2.4.2 Mounting of components.....	18
3 Quality assessment procedures.....	21

3.1	General	21
3.2	Definitions	21
3.2.1	Primary stage of manufacture	21
3.2.2	Structurally similar components	21
3.2.3	Assessment level EZ	21
3.3	Formation of inspection lots.....	21
3.4	Qualification approval.....	22
3.4.1	Qualification approval on the basis of the fixed sample size procedure	22
3.4.2	Qualification approval on the basis of lot-by-lot and periodic testing	23
3.5	Quality conformance inspection.....	23
3.6	Technology approval procedures.....	23
3.7	Delayed delivery.....	23
Annex A	(normative) 0 Ω resistors (Jumper)	36
A.1	Information to be specified in a detail specification	36
A.2	Preferred characteristics.....	36
A.3	Preferred ratings	36
A.4	Preferred severities	36
A.5	Test schedule for qualification approval.....	37
A.6	Test schedule for quality conformance inspection.....	37
Annex B	(informative) Letter symbols and abbreviations	38
B.1	Letter symbols.....	38
B.2	Abbreviations	39
	Bibliography.....	40
	Figure 1 – Shape and dimensions of rectangular (RR) resistors	10
	Figure 2 – Shape and dimensions of cylindrical (RC) resistors	10
	Figure 3 – Derating curve	14
	Figure 4 – Basic layout for mechanical, environmental and electrical tests, Kelvin (4 point) connections	19
	Figure 5 – Attachment of the sense line for Kelvin (4 point) connections for specimen with nominal resistance lower than 100 m Ω	19
	Figure 6 – Basic layout for mechanical, environmental and electrical tests.....	20
	Table 1a – Preferred styles for rectangular (RR) resistors.....	9
	Table 1b – Preferred styles for cylindrical (RC) resistors.....	10
	Table 2 – Permitted change of resistance	11
	Table 3a – Limits for change of resistance	12
	Table 3b – Limits for change of resistance.....	13
	Table 4 – Shear test force.....	17
	Table 5 – Soldering pad dimensions	20
	Table 6 – Test schedule for qualification approval.....	24
	Table 7a – Test schedule for quality conformance inspection: Lot-by-lot tests.....	30
	Table 7b – Test schedule for quality conformance inspection: Periodic tests.....	32

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIXED RESISTORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 8: Sectional specification – Fixed surface mount resistors

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60115-8 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This second edition cancels and replaces the first edition, published in 1989, and its Amendment 1 (2000). This second edition constitutes a technical revision and includes test conditions and requirements for lead-free soldering and assessment procedures meeting the requirements of a "zero defect" approach.

The major technical changes with regard to the first edition are the following:

- introduction of a product classification based on application requirements;
- extension of the list of styles and dimensions;
- use of an extended scope of stability class definitions;
- extension of the lists of preferred values of ratings
- inclusion of test conditions and requirements for lead-free soldering, for periodic overload and for resistance to electrostatic discharge (ESD);

- inclusion of a new set of severities for a shear test;
- inclusion of definitions for a test board;
- replacement of assessment level E and possible others by the sole assessment level EZ, meeting the requirements of a “zero defect” approach;
- inclusion of an extended endurance test, a flammability test, a temperature rise test, vibration tests, an extended rapid change of temperature test, and a single pulse high-voltage overload test;
- inclusion of requirements applicable to 0 Ω resistors (jumpers).

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

FDIS	Report on voting
40/1933/FDIS	40/1970/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.

A list of all the parts of the IEC 60115 series, under the general title *Fixed resistors for use in electronic equipment*, can be found on the IEC website.

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.

FIXED RESISTORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 8: Sectional specification – Fixed surface mount resistors

1 General

1.1 Scope

This part of IEC 60115 is applicable to fixed surface mount resistors for use in electronic equipment.

These resistors are typically described according to types (different geometric shapes) and styles (different dimensions). They have metallized terminations and are primarily intended to be mounted directly on to a circuit board.

1.2 Object

The object of this standard is to prescribe preferred ratings and characteristics and to select from IEC 60115-1, the appropriate quality assessment procedures, tests and measuring methods and to give general performance requirements for this type of resistor.

Test severities and requirements prescribed in detail specifications referring to this sectional specification shall be of equal or higher performance level, because lower performance levels are not permitted.

1.3 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 60062:2004, *Marking codes for resistors and capacitors*

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*
Amendment 1(1992)

IEC 60068-2-58:2004, *Environmental testing – Part 2-58: Tests – Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)*

IEC 60115-1:2008, *Fixed resistors for use in electronic equipment – Part 1: Generic specification*

IEC 61193-2:2007, *Quality assessment systems – Part 2: Selection and use of sampling plans for inspection of electronic components and packages*

IEC 61340-3-1, *Electrostatics – Part 3-1: Methods for simulation of electrostatic effects – Human body model (HBM) electrostatic discharge test waveforms*

IEC 61760-1:2006, *Surface mounting technology – Part 1: Standard method for the specification of surface mounting components (SMDs)*