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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fixed resistors for use in electronic equipment – Part 2: Sectional specification: Leaded fixed low power film resistors

Résistances fixes utilisées dans les équipements électroniques – Partie 2: Spécification intermédiaire: Résistances fixes à broches à couches, à faible dissipation

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIXED RESISTORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 2: Sectional specification: Leaded fixed low power film resistors

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International Standard IEC 60115-2 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This third edition cancels and replaces the second edition, published in 1982, and it constitutes a technical revision.

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

– it includes test conditions and requirements for lead-free soldering and assessment procedures meeting the requirements of a "zero defect" approach;
– it introduces a product classification based on application requirements;
– it includes an extension of the list of styles and dimensions;
– it includes the use of an extended scope of stability class definitions;
– it includes the extension of the lists of preferred values of ratings;

– it includes test conditions and requirements for lead-free soldering, for periodic overload and for resistance to electrostatic discharge (ESD);
– it includes a new set of severities for a shear test;
– it includes definitions for a test board;
– it includes the replacement of assessment level E and possible others by the sole assessment level EZ, meeting the requirements of a “zero defect” approach;
– it includes 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;
– it includes requirements applicable to 0 Ω resistors (jumpers);
– it includes recommendations for the denomination, description, packaging and quality assessment of radial formed styles;
– it includes prescriptions for endurance testing at room temperature, supplementary to the rulings of IEC 60115-1.

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

FDIS	Report on voting
40/2282/FDIS	40/2289/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.

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability 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.

FIXED RESISTORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 2: Sectional specification: Leaded fixed low power film resistors

1 Scope

This part of IEC 60115 is applicable to leaded fixed low-power film resistors for use in electronic equipment.

These resistors are typically described according to types (different geometric shapes) and styles (different dimensions) and product technology. The resistive element of these resistors is typically protected by a conformal lacquer coating. These resistors have wire terminations and are primarily intended to be mounted on a circuit board in through-hole technique.

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.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 60068-1:2013, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-1, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-20:2008, *Environmental testing – Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices with leads*

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

IEC 60286-1, *Packaging of components for automatic handling – Part 1: Tape packaging of components with axial leads on continuous tapes*

IEC 60294:2012, *Measurement of the dimensions of a cylindrical component with axial terminations*

IEC 60301, *Preferred diameters of wire terminations of capacitors and resistors*

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

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

3 Terms, definitions, product technologies and product classification

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60115-1:2008, 2.2, as well as the following, apply.

3.1.1
axial style
physical design of a component with leads extending to both sides along the longitudinal axis of the components body

3.1.2
radial style
physical design of a component with leads extending to one side along the longitudinal or along the diagonal axis of the component body

Note 1 to entry: The single direction of the leads may originate from inside the component body or by forming one or both leads outside of the component body.

3.2 Product technologies

3.2.1 Metal film technology

The resistive element of a metal film resistor is a thin and homogeneous layer of a metal alloy, deposited on a ceramic core or substrate. Typical examples for such metal alloys are nickel chrome in various compositions and complexities, or tantalum nitride, which are typically deposited by sputtering or by evaporation. The typical thickness of a metal film layer is in the range of 50 nm to 4 μm.

Metal film technology permits achievement of specific levels of temperature stability by choice of material and variation of processing.

Where coding of the resistor technology is required, character M shall be used to identify the metal film technology.

NOTE A common alternative designation for metal film is thin film, which is mainly used for surface mount resistors.

3.2.2 Metal glaze technology

The resistive element of a metal glaze resistor is a thick and heterogeneous layer of a glaze, deposited on a ceramic core or substrate. The glaze is typically filled with ruthenium oxide (noble metal) or with tantalum nitride (non-noble metal) and deposited by coating a cylindrical core, or by printing on a flat substrate. The typical thickness of a metal glaze layer is in the range of 3 μm to 20 μm.

Metal glaze technology permits achievement of several specific levels of temperature stability, mainly by choice of material.

Where coding of the resistor technology is required, character G shall be used to identify the metal glaze technology.