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EIA STANDARD

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Fixed Capacitors for Use in Electronic Equipment - Part 9: Sectional Specification: Fixed Capacitors of Ceramic Dielectric, Class 2

EIA-60384-9
(IEC 60384-9:2015, IDT)

October 2017



Electronic Components Industry Association

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This document is the EIA Standard EIA-60384-9-2017: *Fixed Capacitors for Use in Electronic Equipment - Part 9: Sectional Specification – Fixed Capacitors of Ceramic Dielectric, Class 2*.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 9: Sectional specification: Fixed capacitors of ceramic dielectric, Class 2

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International Standard IEC 60384-9 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This fourth edition cancels and replaces the third edition published in 2005. This fourth edition is a result of maintenance activities related to the previous edition. All changes that have been agreed upon can be categorized as minor revisions.

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

FDIS	Report on voting
40/2339/FDIS	40/2364/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 parts in the IEC 60384 series, published under the general title *Fixed capacitors 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 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- withdrawn,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 CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 9: Sectional specification: Fixed capacitors of ceramic dielectric, Class 2

1 General

1.1 Scope

This part of IEC 60384 is applicable to fixed capacitors of ceramic dielectric with a defined temperature coefficient (dielectric Class 2), intended for use in electronic equipment, including leadless capacitors but excluding fixed surface mount multilayer capacitors of ceramic dielectric, which are covered by IEC 60384-22 (Class 2).

Capacitors for electromagnetic interference suppression are not included, but are covered by IEC 60384-14.

1.2 Object

The object of this standard is to prescribe preferred ratings and characteristics and to select from IEC 60384-1:2008 the appropriate quality assessment procedures, tests and measuring methods and to give general performance requirements for this type of capacitor. 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 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 60063:1963, *Preferred number series for resistors and capacitors*

IEC 60063:1963/AMD1:1967

IEC 60063:1963/AMD2:1977

IEC 60068-1:2013, *Environmental testing – Part 1: General and guidance*

IEC 60384-1:2008, *Fixed capacitors 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*

ISO 3:1973, *Preferred numbers – Series of preferred numbers*

1.4 Information to be given in a detail specification

1.4.1 General

Detail specifications shall be derived from the relevant blank detail specification.

Detail specifications shall not specify requirements inferior to those of the generic, sectional or blank detail specification. When more severe requirements are included, they shall be

listed in 1.9 of the detail specification and indicated in the test schedules, for example by an asterisk.

The information given in 1.4.2 may for convenience, be presented in tabular form.

The following information shall be given in each detail specification and the values quoted shall preferably be selected from those given in the appropriate clause of this sectional specification.

1.4.2 Outline drawing and dimensions

There shall be an illustration of the capacitor as an aid to easy recognition and for comparison of the capacitor with others.

Dimensions and their associated tolerances, which affect interchangeability and mounting, shall be given in the detail specification. All dimensions shall preferably be stated in millimetres, however when the original dimensions are given in inches, the converted metric dimensions in millimetres shall be added.

Normally, the numerical values shall be given for the length of the body, the width and height of the body and the wire spacing, or for cylindrical types, the body diameter, and the length and diameter of the terminations. When necessary, for example when a number of items (capacitance values/voltage ranges) are covered by a detail specification, the dimensions and their associated tolerances shall be placed in a table below the drawing.

When the configuration is other than described above, the detail specification shall state such dimensional information as will adequately describe the capacitors. When the capacitor is not designed for use on printed boards, this shall be clearly stated in the detail specification.

1.4.3 Mounting

The detail specification shall specify the method of mounting to be applied for normal use and for the application of the vibration and the bump or shock tests. The design of the capacitor may be such that special mounting fixtures are required in its use. In this case, the detail specification shall describe the mounting fixtures and they shall be used in the application of the vibration and the bump or shock tests.

1.4.4 Ratings and characteristics

1.4.4.1 General

The ratings and characteristics shall be in accordance with the relevant clauses of this standard, together with the following:

1.4.4.2 Nominal capacitance range

See 2.2.4.1.

When products approved to the detail specification have different ranges, the following statement should be added: "The range of capacitance values available in each voltage range is given in the register of approvals".

1.4.4.3 Particular characteristics

Additional characteristics may be listed, when they are considered necessary to specify adequately the component for design and application purposes.

1.4.4.4 Soldering

The detail specification shall prescribe the test methods, severities and requirements applicable for the solderability and the resistance to soldering heat tests.

1.4.5 Marking

The detail specification shall specify the content of the marking on the capacitor and on the packaging. Deviations from 1.6 shall be specifically stated.

1.5 Terms and definitions

For the purposes of this document, the applicable terms and definitions of IEC 60384-1 as well as the following apply.

1.5.1

fixed capacitors, ceramic dielectric, Class 2

capacitor which has a dielectric with a high permittivity and is suitable for by-pass and coupling applications or for frequency discriminating circuits where low losses and high stability of capacitance are not of major importance

Note 1 to entry: The ceramic dielectric is characterized by the non-linear change of capacitance over the category temperature range (see Table 2).

1.5.2

subclass

maximum percentage change of capacitance within the category temperature range with respect to the capacitance at 20 °C

Note 1 to entry: The subclass may be expressed in code form (see Table 2).

1.5.3

rated voltage

U_R

maximum d.c. voltage which may be applied continuously to the terminations of a capacitor at the rated temperature

Note 1 to entry: Maximum d.c. voltage is the sum of the d.c. voltage and peak a.c. voltage or peak pulse voltage applied to the capacitor.

[SOURCE: IEC 60384-1:2008, 2.2.25, modified (addition of "the terminations of")]

1.6 Marking

1.6.1 General

See IEC 60384-1:2008, 2.4, with the following details:

The information given in the marking is normally selected from the following list; the relative importance of each item is indicated by its position in the list:

- a) nominal capacitance;
- b) rated voltage (d.c. voltage may be indicated by the symbol $\overline{\text{---}}$ or ---);
- c) tolerance on nominal capacitance;
- d) the dielectric subclass, see Table 2;
- e) year and month (or week) of manufacture;
- f) manufacturer's name or trade mark;
- g) climatic category;

- h) manufacturer's type designation;
- i) reference to the detail specification.

Information required under b) and d) may be given in code form under manufacturer's, or national, type or style designation.

1.6.2 Marking on the body

The capacitor shall be clearly marked with a), b) and c) of 1.6.1 and with as many as possible of the remaining items as is considered necessary. Any duplication of information in the marking on the capacitor should be avoided.

1.6.3 Marking of the packaging

The packaging containing the capacitor(s) shall be clearly marked with all the information listed in 1.6.1.

1.6.4 Additional marking

Any additional marking shall be so applied that no confusion can arise.

2 Preferred ratings and characteristics

2.1 Preferred characteristics

Preferred climatic categories only shall be given in the preferred characteristics.

The capacitors covered by this standard are classified into climatic categories according to the general rules given in IEC 60068-1:2013, Annex A.

The lower and upper category temperatures and the duration of the damp heat, steady state test shall be chosen from the following:

- lower category temperature: –55 °C, –40 °C, –25 °C and –10 °C
- upper category temperature: +70 °C, +85 °C, +100 °C and +125 °C
- duration of the damp heat, steady state test (40 °C, 93 % RH): 4, 10, 21 and 56 days

The severities for the cold and dry heat tests are the lower and upper category temperatures respectively.

2.2 Preferred values of ratings

2.2.1 Rated temperature

For capacitors covered by this standard, the rated temperature is equal to the upper category temperature.

2.2.2 Rated voltage (U_R)

The preferred values of rated voltage are: 25, 40, 63, 100, 160, 250, 400, 630, 1 000, 1 600, 2 500, 4 000 and 6 300 V. These values conform to the basic series of preferred values R5 given in ISO 3. If other values are needed they shall be chosen from the R10 series.

The sum of the d.c. voltage and the peak a.c. voltage applied to the capacitor should not exceed the rated voltage. The value of the peak alternating voltage should not exceed the value determined by the permissible reactive power.