BS EN IEC 60384-23:2023

BSI Standards Publication

Fixed capacitors for use in electronic equipment

Part 23: Sectional specification — Fixed metallized polyethylene naphthalate film dielectric surface mount DC capacitors

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Full document details: BS EN IEC 60384-23:2023

National foreword

This British Standard is the UK implementation of EN IEC 60384-23:2023. It is identical to IEC 60384-23:2023. It supersedes BS EN 60384-23:2015, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee W/-, Consumer Products and Services Sector Policy and Strategy Committee.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Amendments/corrigenda issued since publication

Date	Text affected

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EUROPEAN STANDARD

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English Version

Fixed capacitors for use in electronic equipment - Part 23: Sectional specification - Fixed metallized polyethylene naphthalate film dielectric surface mount DC capacitors (IEC 60384-23:2023)

Condensateurs fixes utilisés dans les équipements électroniques - Partie 23: Spécification intermédiaire - Condensateurs fixes pour montage en surface pour courant continu à diélectrique en film de polynaphtalate d'éthylène métallisé
(IEC 60384-23:2023)

Festkondensatoren zur Verwendung in Geräten der Elektronik - Teil 23: Rahmenspezifikation - Oberflächenmontierbare Festkondensatoren für Gleichspannung mit metallisierter Polyethylen-Naphthalat-Folie als Dielektrikum
(IEC 60384-23:2023)

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European foreword

The text of document 40/2983/FDIS, future edition 3 of IEC 60384-23, prepared by IEC/TC 40 "Capacitors and resistors for electronic equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60384-23:2023.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2023-12-10
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2026-03-10

This document supersedes EN 60384-23:2015 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 60384-23:2023 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60384-14 NOTE Approved as EN 60384-14

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60062	-	Marking codes for resistors and capacitors	EN 60062	-
IEC 60063	-	Preferred number series for resistors and capacitors	EN 60063	-
IEC 60068-1	2013	Environmental testing - Part 1: General and guidance	EN 60068-1	2014
IEC 60384-1	2021	Fixed capacitors for use in electronic equipment - Part 1: Generic specification	EN IEC 60384-1	2021
IEC 61193-2	2007	Quality assessment systems - Part 2: Selection and use of sampling plans for inspection of electronic components and packages	EN 61193-2	2007
ISO 3	-	Preferred numbers - Series of preferred numbers	-	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 23: Sectional specification – Fixed metallized polyethylene naphthalate film dielectric surface mount DC capacitors

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.
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IEC 60384-23 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment. It is an International Standard.

This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision.

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

a) this edition includes the following significant technical changes with respect to the previous edition: revision of all parts of the document based on the ISO/IEC Directives, Part 2:2021, and harmonization with other similar kinds of documents;
b) the document structure has been organized to follow new sectional specification structure decided in TC 40;
c) revised tables and Clause 5 so as to prevent duplications and contradictions;

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d) in Subclause 5.2 (Mounting), the Subclauses 5.2.1, 5.2.2 and 5.2.3 have been added;

e) in Subclause 5.5 (Shear test), the Subclauses 5.5.1 and 5.5.2 have been added;

f) in Subclause 5.14 (Component solvent resistance), the Subclauses 5.14.1 and 5.14.2 have been added. In Table 8 and Table A.2, test 5.14 has been moved before 5.7.5 (Final inspections and requirements) in Group 1A and in Subgroup C1;

g) In Subclause 5.15 (Solvent resistance of marking), the Subclauses 5.15.1 and 5.15.2 have been added;

h) tangent of loss angle measurement has been added to the resistance to soldering heat test;

i) lot-by-lot and periodical inspection tables including requirements have been moved to Annex A;

j) revised Inspection Level (IL) of A1 subgroup.

The text of this International Standard is based on the following documents:

Draft	Report on voting
40/2983/FDIS	40/3019/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

The list of all parts of the IEC 60384 series, under the general title *Fixed capacitors for use in electronic equipment*, can be found on the IEC web site.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 23: Sectional specification – Fixed metallized polyethylene naphthalate film dielectric surface mount DC capacitors

1 Scope

This part of IEC 60384 is applicable to fixed surface mount capacitors for direct current, with metallized electrodes and polyethylene naphthalate dielectric for use in electronic equipment. These capacitors have metallized connecting pads or soldering strips and are intended to be mounted directly onto printed boards or onto substrates for hybrid circuits. These capacitors can have "self-healing properties" depending on conditions of use. They are primarily intended for applications where the AC component is small with respect to the rated voltage.

This part of IEC 60384 specifies preferred ratings and characteristics, selects from IEC 60384-1:2021 the appropriate quality assessment procedures, tests and measuring methods and gives general performance requirements for this type of capacitor. Test severities and requirements specified in detail specifications referring to this sectional specification are of an equal or higher performance level. Lower performance levels are not permitted.

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, *Marking codes for resistors and capacitors*

IEC 60063, *Preferred number series for resistors and capacitors*

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

IEC 60384-1:2021, *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, *Preferred numbers – Series of preferred numbers*

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3 Terms and definitions

For the purposes of this document, the terms and definitions of IEC 60384-1:2021,and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
grade 1 capacitors
<long-life> capacitors for long-life applications with stringent requirements for the electrical parameters

3.2
grade 2 capacitors
<general purpose> capacitors for general applications for which the stringent requirements for grade 1 capacitors are not necessary

3.3
grade 3 capacitors
<low temperature, miniature type> miniature type capacitors having a rated temperature of 85°C and for which less stringent requirements than for grade 2 capacitors are acceptable

4 Preferred ratings and characteristics

4.1 Preferred climatic categories

The values given in detail specifications should be selected from the following.

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

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

Lower category temperature: −55 °C, −40 °C and −25 °C.

Upper category temperature: +85 °C (only grade 3), +100 °C, +125 °C and +155 °C.

Duration of the damp heat, steady state test: 21 days and 56 days.

At continuous operation at 155 °C beyond the endurance test time, accelerated ageing shall be carried out (see detail specification).

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

4.2 Preferred values of ratings

4.2.1 Nominal capacitance (C_N)

Preferred values of nominal capacitance shall be taken from the E6 series of IEC 60063:

1,0 – 1,5 – 2,2 – 3,3 – 4,7 and 6,8 and their decimal multiples (× 10^n, n = integer).

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If other values are required, they should be chosen from the E12 series.

4.2.2 Tolerance on nominal capacitance

The preferred tolerances on the nominal capacitance are ±5 %, ±10 % and ±20 %.

4.2.3 Rated voltage (U_R)

The preferred values of rated voltage shall be taken from R10 series of ISO 3 are:

1,0 – 1,6 – 2,5 – 4,0 – 5,0 – 6,3 and their decimal multiples (× 10^n, n: integer).

The sum of the DC voltage and the peak AC voltage applied to the capacitor shall not exceed the rated voltage.

The value of the peak AC voltage shall not exceed the percentages of the rated voltage at the frequencies stated in Table 1 and should not be greater than 280 V, unless otherwise specified in the detail specification.

Table 1 – Percentage limit of the rated voltage at AC voltage frequency

AC voltage frequency Hz	Percentage limit of the rated voltage %
50	20
100	15
1 000	3
10 000	1

4.2.4 Category voltage (U_C)

The category voltage for Grade 1 and Grade 2 capacitors is:

– for upper category temperature 125 °C: 0,8 U_R;

– for upper category temperature 155 °C: 0,5 U_R.

The category voltage for Grade 3 capacitors is:

– for upper category temperature 100 °C: 0,8 U_R;

– for upper category temperature 125 °C: 0,5 U_R.

4.2.5 Rated temperature

Grade 1 and Grade 2 capacitors

The standard value of rated temperature is 100 °C.

Grade 3 capacitors

The standard value of rated temperature is 85 °C.

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