

INTERNATIONAL STANDARD

IEC 60384-18

QC 302300

Second edition
2007-03

Fixed capacitors for use in electronic equipment –

Part 18:

Sectional specification –

Fixed aluminium electrolytic surface mount capacitors with solid (MnO₂) and non-solid electrolyte

(<https://standards.iteh.ai>)
Document Preview

<https://standards.iteh.ai>
IEC 60384-18:2007

<https://standards.iteh.ai/catalog/standards/iec/60384-18:2007>



Reference number
IEC 60384-18:2007(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Further information on IEC publications

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

- **IEC Web Site** (www.iec.ch)
- **Catalogue of IEC publications**
The on-line catalogue on the IEC web site (www.iec.ch/searchpub) enables you to search by a variety of criteria including text searches, technical committees and date of publication. On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.
- **IEC Just Published**
This summary of recently issued publications (www.iec.ch/online_news/justpub) is also available by email. Please contact the Customer Service Centre (see below) for further information.
- **Customer Service Centre**

If you have any questions regarding this publication or need further assistance, please contact the Customer Service Centre:

Email: custserv@iec.ch
Tel: +41 22 919 02 11
Fax: +41 22 919 03 00

INTERNATIONAL STANDARD

IEC 60384-18

QC 302300

Second edition
2007-03

Fixed capacitors for use in electronic equipment –

Part 18:

Sectional specification – Fixed aluminium electrolytic surface mount capacitors with solid (MnO₂) and non-solid electrolyte

(<https://standards.iteh.ai>)
Document Preview

IEC 60384-18:2007

<https://standards.iteh.ai/catalog/standards/iec/0041567c-fea1-4034-9352-d7bd90b2ba77/iec-60384-18-2007>

© IEC 2007 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

U

For price, see current catalogue

CONTENTS

FOREWORD.....	4
1 General	6
1.1 Scope.....	6
1.2 Object	6
1.3 Normative references	6
1.4 Information to be given in a detail specification	7
1.5 Terms and definitions	8
1.6 Marking	8
2 Preferred ratings and characteristics	9
2.1 Preferred characteristics	9
2.2 Preferred values of ratings	9
3 Quality assessment procedures	10
3.1 Primary stage of manufacture	10
3.2 Structurally similar components	10
3.3 Certified records of released lots	10
3.4 Qualification approval procedures	10
3.5 Quality Conformance Inspection	21
4 Test and measurement procedures	23
4.1 Drying.....	23
4.2 Measuring conditions	23
4.3 Mounting	23
4.4 Visual examination and check of dimensions.....	23
4.5 Electrical tests	23
4.6 Resistance to soldering heat	25
4.7 Solderability.....	25
4.8 Shear test.....	25
4.9 Substrate bending test.....	25
4.10 Rapid change of temperature.....	26
4.11 Climatic sequence	26
4.12 Damp heat, steady state	26
4.13 Characteristics at high and low temperature.....	27
4.14 Surge	27
4.15 Endurance	27
4.16 Reverse voltage (if required by the detail specification)	28
4.17 Storage at high temperature	28
4.18 Storage at low temperature (for non-solid electrolyte capacitors only).....	29
4.19 Charge and discharge (if required by the detail specification)	29
4.20 Component solvent resistance (if applicable)	29
4.21 Solvent resistance of the marking (if applicable).....	29
4.22 High surge current (for solid electrolyte capacitors only and if required by the detail specification).....	30

Table 1 – Category voltages.....	10
Table 2 – Sampling plan for qualification approval, assessment level EZ.....	12
Table 3 – Test schedule for qualification approval	13
Table 4 – Lot-by-lot inspection.....	22
Table 5 – Periodic inspection.....	22

iTech Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 60384-18:2007](https://standards.iteh.ai/catalog/standards/iec/084f567c-fea1-4034-9352-d7bd90b2ba77/iec-60384-18-2007)

<https://standards.iteh.ai/catalog/standards/iec/084f567c-fea1-4034-9352-d7bd90b2ba77/iec-60384-18-2007>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –**Part 18: Sectional specification –
Fixed aluminium electrolytic surface mount capacitors
with solid (MnO₂) and non-solid electrolyte**

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 60384-18 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 1993 and its amendment 1 (1998). This edition constitutes a minor revision related to tables, figures and references.

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

CDV	Report on voting
40/1764/CDV	40/1822/RVC

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.

The QC number that appears on the front cover of this publication is the specification number in the IEC Quality Assessment System for Electronic Components (IECQ).

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 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.

iTech Standards
(<https://standards.itih.ai>)
Document Preview

[IEC 60384-18:2007](https://standards.itih.ai/catalog/standards/iec/084f567c-fea1-4034-9352-d7bd90b2ba77/iec-60384-18-2007)

<https://standards.itih.ai/catalog/standards/iec/084f567c-fea1-4034-9352-d7bd90b2ba77/iec-60384-18-2007>

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 18: Sectional specification – Fixed aluminium electrolytic surface mount capacitors with solid (MnO₂) and non-solid electrolyte

1 General

1.1 Scope

This part of IEC 60384 applies to fixed aluminium electrolytic surface mount capacitors with solid (MnO₂) and non-solid electrolyte primarily intended for d.c. applications for use in electronic equipment.

1.2 Object

The object of this standard is to prescribe preferred ratings and characteristics and to select from IEC 60384-1 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 should 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 60063, *Preferred number series for resistors and capacitors*

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

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 60384-1:1999, *Fixed capacitors for use in electronic equipment – Part 1: Generic specification*

IEC 60384-18-1, *Fixed capacitors for use in electronic equipment – Part 18-1: Blank detail specification – Fixed aluminium electrolytic chip capacitors with solid (MnO₂) electrolyte - Assessment level EZ*

IEC 60384-18-2, *Fixed capacitors for use in electronic equipment – Part 18-2: Blank detail specification – Fixed aluminium electrolytic chip capacitors with non-solid electrolyte - Assessment level EZ*

IEC 60410, *Sampling plans and procedures for inspection by attributes*

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

1.4 Information to be given in a detail specification

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.

NOTE The information given in 1.4.1 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.

1.4.1 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 capacitor. When the capacitor is not designed for use on printed boards, this shall be clearly stated in the detail specification.

1.4.2 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 capacitors shall be mounted by their normal means. 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 bump or shock tests.

1.4.3 Ratings and characteristics

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

1.4.3.1 Rated capacitance range

See 2.2.1.

NOTE When products approved to the detail specification have different ranges, the following statement should be added: "The range of values available in each voltage range is given in IEC QC 001005."

1.4.3.2 Particular characteristics

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

1.4.3.3 Soldering

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

1.4.4 Marking

The detail specification shall specify the content of the marking on the capacitor and on the package. Deviations in 1.6 of this sectional specification shall be specifically stated.

1.5 Terms and definitions

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

1.5.1

capacitance of an electrolytic capacitor

capacitance of an equivalent circuit having capacitance and resistance in series measured with alternating current approximately sinusoidal waveform at a specified frequency

1.5.2

surface mount capacitor

capacitor whose small dimensions or nature or shape of terminations make it suitable for surface mounting in hybrid circuits and printed boards.

1.5.3

reverse voltage (for polar capacitors only)

voltage applied to the capacitor terminals in the reverse polarity direction

1.6 Marking

According to 2.4 of IEC 60384-1, with the following details:

1.6.1 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) polarity of the terminations (unless identified by the construction)
- b) rated capacitance;
- c) rated voltage (d.c. voltage may be indicated by the symbol: --- or —);
- d) tolerance on rated capacitance;
- e) reference to the grade (in accordance with 1.1).
- f) year and month (or week) of manufacture;
- g) manufacturer's name or trade mark;
- h) climatic category;
- i) manufacturer's type designation;
- j) reference to the detail specification.

1.6.2 Surface mount capacitors are generally not marked on the body. If some marking can be applied, they shall be clearly marked with as many as possible of the remaining items as is considered useful. Any duplication of information in the marking on the capacitor should be avoided.

1.6.3 Any marking shall be legible and not easily smeared or removed by rubbing with the finger.

1.6.4 The package containing the capacitor(s) shall be clearly marked with all the information listed in 1.6.1, except polarity, unless this is applicable to the method of packing.

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

2 Preferred ratings and characteristics

2.1 Preferred characteristics

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

2.1.1 Preferred climatic categories

The capacitors covered by this specification are classified into climatic categories according to the general rules given in IEC 60068-1.

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: $-55\text{ }^{\circ}\text{C}$, $-40\text{ }^{\circ}\text{C}$, $-25\text{ }^{\circ}\text{C}$ and $-10\text{ }^{\circ}\text{C}$.

Upper category temperature: $+85\text{ }^{\circ}\text{C}$, $+100\text{ }^{\circ}\text{C}$, $+105\text{ }^{\circ}\text{C}$ and $+125\text{ }^{\circ}\text{C}$.

Duration of the damp-heat, steady-state test: 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 capacitance (C_R)

Preferred values of rated capacitance are chosen from the E6 series of IEC 60063 and their decimal multiples.

2.2.2 Tolerance on rated capacitance

Preferred values of tolerances on rated capacitance are:

$-10 / +10\text{ }%$ and $-20 / +20\text{ }%$

2.2.3 Rated voltage (U_R)

Preferred values of rated direct voltages taken from the R5 series of ISO 3 are:

1,0 V, 1,6 V, 2,5 V, 4,0 V, 6,3 V and their decimal multiples

If other values are required, they shall preferably be chosen from the R10 series.

Also 35 V is preferred.

2.2.4 Category voltage (U_C)

For capacitors having an upper category temperature of $125\text{ }^{\circ}\text{C}$, category voltages are given in Table 1.