

INTERNATIONAL STANDARD

IEC
60384-3

QC 300800

Third edition
2006-10

Fixed capacitors for use in electronic equipment –

Part 3:

**Sectional specification: Surface mount fixed
tantalum electrolytic capacitors with manganese
dioxide solid electrolyte**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 3: Sectional specification: Surface mount fixed tantalum electrolytic capacitors with manganese dioxide solid electrolyte

FOREWORD

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International Standard IEC 60384-3 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 1989 and constitutes a minor revision related to tables, figures and references.

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

FDIS	Report on voting
40/1771/FDIS	40/1789/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.

The QC numbers that appear on the front cover of this publication are the specification numbers in the IEC Quality Assessment System for Electronic Components (IECQ).

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

The list of all the parts of the IEC 60384 series, under the (new) 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- withdrawn,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.

The contents of the corrigendum of January 2007 have been included in this copy.

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FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 3: Sectional specification: Surface mount fixed tantalum electrolytic capacitors with manganese dioxide solid electrolyte

1 General

1.1 Scope

This specification applies to surface mount tantalum solid electrolyte capacitors. These capacitors are primarily intended to be mounted directly onto substrates for hybrid circuits or onto printed boards.

The following two styles are considered:

- Style 1: protected capacitors;
- Style 2: unprotected capacitors.

1.2 Object

The object of this standard is to prescribe preferred ratings and characteristics and to select from IEC 60384-1:1999, the appropriate quality assessment procedures, tests and measuring methods and to give general performance requirements for this type of capacitor.

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, *Marking codes for resistors and capacitors*

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

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

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

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.

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

The detail specification shall give 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. All dimensions are to be stated in mm.

NOTE The information given in 1.4.1 may for convenience be presented in tabular form.

Normally, the numerical values shall be given for the length, width and height of the body. When necessary, for example, when a number of case sizes 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.

1.4.2 Mounting

The detail specification shall give guidance on methods of mounting for normal use. Mounting for test and measurement purposes (if required) shall be in accordance with 4.3.

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 the qualified products list (QPL)".

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 test 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 from 1.5 of this sectional specification shall be specifically stated.

1.5 Terms and definitions

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

1.5.1

surface mount capacitor

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

1.5.2 rated voltage

U_R

See 2.2.16 of IEC 60384-1

NOTE 1 The sum of the d.c. voltage and the peak a.c. voltage applied to the capacitor should not exceed the rated voltage.

NOTE 2 For short periods, however, the rated voltage may be exceeded (see 2.2.5 and 4.14).

1.5.3 Class 1

capacitor with low dielectric losses and high stability of capacitance; Ta powders with low volumetric capacitance values are used

1.5.4 Class 2

capacitor with a dielectric of medium range volumetric capacitance for applications where low losses and high stability of capacitance are not of major importance

1.5.5 Class 3

capacitor with a dielectric of high volumetric capacitance for applications where small size and high capacitance values are essential, and higher losses and less stability of capacitance can be tolerated

1.6 Marking

See 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, in clear or coded form;
- c) rated voltage, in clear or coded form, (d.c. voltage may be indicated by the symbol (==== or —)),
- d) tolerance on rated capacitance;
- e) style (in accordance with 1.1);
- f) year and month (or week) of manufacture;
- g) manufacturer's name or trade mark;
- i) climatic category;
- j) manufacturer's type designation;
- k) 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 above items as is considered useful. Designation of polarity is a mandatory item. Any duplication of information in the marking on the capacitor should be avoided. Where space does not permit the marking of the capacitor in accordance with IEC 60062 the following code may be used.

a) Capacitance coding

The rated capacitance value in picofarad is given by the following digit and letter code.

Letter	Value	Digit	Multiplier
A	1,0	9	10^{-1}
C	1,2	0	10^0
E	1,5	1	10^1
G	1,8	2	10^2
J	2,2	3	10^3
L	2,7	4	10^4
N	3,3	5	10^5
Q	3,9	6	10^6
S	4,7	7	10^7
U	5,6	8	10^8
W	6,8		
Y	8,2		

b) Voltage coding

For code letters for marking, see the detail specification.

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 1.5.1, 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 °C.
Upper category temperature:	+85 °C and +125 °C.
Duration of the damp heat, steady state test:	Style 1: 21 and 56 days Style 2: --

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