
Sectional specification: Tantalum surface mounting capacitors

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Rahmenspezifikation: Oberflächenmontierbare Tantalkondensatoren

Spécification intermédiaire: Condensateurs au tantale pour montage en surface

Ta slovenski standard je istoveten z: EN 130800:2000[SIST EN 130800:2002](https://standards.iteh.ai/catalog/standards/sist/5917afb3-2da3-42d0-a9d3-0f52cffe09c8/sist-en-130800-2002)<https://standards.iteh.ai/catalog/standards/sist/5917afb3-2da3-42d0-a9d3-0f52cffe09c8/sist-en-130800-2002>**ICS:**

31.060.40	Tantalski elektrolitni kondenzatorji	Tantalum electrolytic capacitors
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SIST EN 130800:2002**en**

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EUROPEAN STANDARD

EN 130800

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2000

ICS 31.060.40

Supersedes CECC 30 800:1990

English version

Sectional Specification: Tantalum surface mounting capacitors

Spécification intermédiaire:
Condensateurs au tantale pour
montage en surface

Rahmenspezifikation:
Oberflächenmontierbare
Tantalkondensatoren

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 40XA, Capacitors.

The text of this European Standard consists of the text ratified on 1993-09-15 and two amendments ratified respectively on 1996-12-09 (prAA) and 1997-03-11 (prAB), when it was decided to publish the combined text as EN 130800.

This European Standard supersedes CECC 30 800:1990.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2001-05-01
 - latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2001-05-01
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1 General

1.1 Scope

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

Two styles are considered: Style 1: protected capacitors
Style 2: unprotected capacitors.

The object of this specification is to prescribe preferred ratings and characteristics and selects from the generic specification EN 130000 the appropriate quality assessment procedures, tests and measuring methods and gives general performance requirements for this type of capacitor.

1.2 Related documents

EN 130000	Generic Specification: Fixed capacitors
IEC 60062	Marking codes for resistors and capacitors (harmonized as EN 60062)
IEC 60063:1963 + A1:1967 + A2:1977	Preferred number series for resistors and capacitors
IEC 60068	Basic environmental testing procedures (harmonized in the HD 323 and EN 60068 series)
IEC 60384-3	Fixed capacitors for use in electronic equipment -- Part 3: Sectional specification: Fixed tantalum chip capacitors
IEC 60410	Sampling plans and procedures for inspection by attributes https://standards.iteh.ai/catalog/standards/sist/5917afba-2da3-42d0-a9d3-0f52-2570-8444-130800-2002
ISO 3	Preferred numbers -- Series of preferred numbers

NOTE The above references apply to the current editions, except for IEC 60063 for which the referenced edition must be used.

1.3 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.

1.3.1 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 1.3.1 may for convenience, be presented in tabular form.

Normally the numerical values shall be given for the length, the 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.

1.3.2 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.

1.3.3 Ratings and characteristics

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

1.3.3.1 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 capacitance values available in each voltage range is given in the Qualified Product List (QPL)".

1.3.3.2 Particular characteristics

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

1.3.4 Marking

The detail specification shall specify the content of the marking on the capacitor and on the package. Deviations from 1.5 of this section shall be specifically stated.

1.4 Terminology

In addition to the applicable terms and definitions of EN 130000 the following definitions apply:

1.4.1 Surface mounting capacitor

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

1.4.2 Rated voltage (U_R)

The rated voltage is the maximum DC voltage which may be applied continuously to a capacitor at the rated temperature.

NOTE 1 The sum of the DC voltage and the peak AC voltage applied to the capacitor shall 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 Marking

See 2.4 of EN 130000 with the following details:

1.5.1 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:

- (1) Polarity of the terminations (unless identified by the construction);
- (2) Rated capacitance;
- (3) Rated voltage (DC voltage may be indicated by the symbol $\equiv$ or ---);
- (4) Tolerance on rated capacitance;
- (5) Style (in accordance with 1.1);
- (6) Year and month (or week) of manufacture;
- (7) Manufacturer's name or trade mark;
- (8) Climatic category;
- (9) Manufacturer's type designation;
- (10) Reference to the detail specification.

1.5.2 Surface mounting 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.

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

1.5.4 The package containing the capacitor(s) shall be marked with all the information listed in 1.5.1, except polarity, unless this is applicable to the method of packaging.

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

1.5.6 Where space does not permit the marking of the capacitor in accordance with IEC 60062 the following code may be used.

Capacitance coding:

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

Letter	Value
A	1,0
C	1,2
E	1,5
G	1,8
J	2,2
L	2,7
N	3,3
Q	3,9
S	4,7
U	5,6
W	6,8
Y	8,2

Digit	Multiplier
9	10^{-1}
0	10^0
1	10^1
2	10^2
3	10^3
4	10^4
5	10^5
6	10^6
7	10^7
8	10^8

Voltage coding:

Rated voltage	2	4	6,3	10	16	20	25	35	50
Code letter	Z	G	J	A	C	D	E	V	T

EXAMPLE: W6G = 6,8 μ F 4V

2 Preferred ratings and characteristics

The values given in the detail specification shall preferably be selected from the following:

2.1 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 the upper category temperatures respectively.

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2.2 Preferred values of ratings

2.2.1 Rated capacitance (C_R)

Preferred values of rated capacitance are

1,0 - 1,5 - 2,2 - 3,3 - 4,7 - 6,8 and their decimal multiples.

These values conform to the E6 series of preferred values given in IEC 60063: Preferred number series for resistors and capacitors.

2.2.2 Tolerances on rated capacitance

Preferred tolerances on rated capacitance are

$\pm 10 \%$ and $\pm 20 \%$.

2.2.3 Rated voltage (U_R)

The preferred values of rated voltage taken from the R5 series of ISO 3 are

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

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

2.2.4 Category voltage (U_C)

For capacitors having an upper category temperature of 125 °C category voltages are given in the following table:

U_R (V)	2,5	4	6,3	10	16	25	40	63	100
U_C (V)	1,6	2,5	4	6,3	10	16	25	40	63

2.2.5 Surge voltage

The surge voltage shall be 1,3 times the rated voltage or 1,3 times the category voltage rounded off to the nearest volt.

2.2.6 Rated temperature

The standard value of rated temperature is 85 °C.

3 Quality assessment procedures

3.1 Primary stage of manufacture

The primary stage of manufacture is the forming of the tantalum oxide dielectric.

3.2 Structurally similar components

Capacitors considered as being structurally similar are capacitors produced with similar processes and materials, though they may be of different case sizes and capacitance and voltage values.

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3.3 Certified test records

The information required in 3.9 of EN 130000 shall be made available when prescribed in the detail specification and when requested by a purchaser. After the endurance test the parameters for which variables information is required are the capacitance change, tangent of loss angle and the leakage current.

3.4 Qualification approval

The procedures for qualification approval testing are given in 3.5 of the generic specification EN 130000. The schedule to be used for qualification approval testing on the basis of lot-by-lot and periodic tests is given in 3.5 of this specification. The procedure using a fixed sample size schedule is given in 3.4.1 and 3.4.2 below.

3.4.1 Sampling

The fixed sample size procedure is described in 3.5.3(2) of EN 130000. The sample shall be representative of the range of capacitors for which approval is sought. This may or may not be the complete range covered by the detail specification. The sample shall consist of specimens having the lowest and highest voltages, and for these voltages the smallest and largest case size. When there are more than four case sizes an intermediate case size shall also be tested. In each of these case size/voltage combinations (values) the highest capacitance shall be chosen. Thus for the approval of a range, testing is required of either four or six values. When the range consists of less than four values, the number of specimens to be tested shall be that required for four values.

Spare specimens are permitted as follows:

- (1) One per value which may be used to replace the permitted non-conforming items in Group 0.
- (2) One per value which may be used as replacements for specimens which are non-conforming because of incidents not attributable to the manufacturer.

The numbers given in Group 0 assume that all groups are applicable. If this is not so the numbers may be reduced accordingly.

When additional groups are introduced into the qualification approval test schedule, the number of specimens required for Group 0 shall be increased by the same number as that required for the additional groups.

Table A.1 or B.1 gives the number of samples to be tested in each group or sub-group together with the permissible number of non-conforming items for qualification approval tests.

3.4.2 Tests

The complete series of tests for selected assessment level given in Tables A.1 to A.3, respectively in Tables B.1 to B.3 and the test schedule given in annex C are required for the approval of capacitors covered by one detail specification. The tests of each group shall be carried out in the order given.

The whole sample shall be subjected to the tests of Group 0 and then divided for the other groups.

Non-conforming specimens found during the tests of Group 0 shall not be used for the other groups.

"One non-conforming item" is counted when a capacitor has not satisfied the whole or a part of the tests of a group.

The approval is granted when the number of non-conforming items does not exceed the specified number of permissible non-conforming items for each group or sub-group and the total number of permissible non-conforming items.

NOTE 1 Table A.1 and Table C.1 or Table B.1 and Table C.1 together form the fixed sample size test schedule. Annex A or B includes the details for the sampling and permissible non-conforming items for the different tests or groups of tests whereas annex C together with the details of test contained in clause 4 give a complete summary of test conditions and performance requirements indicate where, for example for the test method or conditions of test, a choice has to be made in the detail specification.

NOTE 2 The conditions of test and performance requirements for the fixed sample size test schedule shall be identical to those prescribed in the detail specification for quality conformance inspection.

3.5 Quality conformance inspection

3.5.1 Formation of inspection lots

3.5.1.1 Groups A and B inspection

These tests shall be carried out on a lot-by-lot basis according to test plan for selected assessment level in Table A.2 or B.2.

A manufacturer may aggregate the current production into inspection lots subject to the following safeguards:

- (1) The inspection lot shall consist of structurally similar capacitors (see 3.2).
- (2a) The sample tested shall be representative of the values and dimensions contained in the inspection lot:
 - in relation to their number
 - with a minimum of five of any one value

- (2b) If there are less than five of any one value in the sample the basis for the drawing of samples shall be agreed between the manufacturer and the National Supervising Inspectorate.

3.5.1.2 Group C inspection

These tests shall be carried out on a periodic basis according to the test plan for selected assessment level in Table A.3 or B.3.

Samples shall be representative of the current production of the specified periods and shall be divided into small, medium and high sizes. In order to cover the range of approvals in any period one voltage shall be tested from each group of sizes. In subsequent periods other sizes and/or voltage ratings in production shall be tested with the aim of covering the whole range of approval.

3.5.2 Test schedule

The test schedule for qualification approval is given in annex C.

3.5.3 Delayed delivery

When according to the procedures of 3.11 of EN 130000 re-inspection has to be made, solderability, capacitance and leakage current shall be checked as specified in Group A and B inspection.

3.5.4 Assessment levels

The assessment level(s) given in the blank detail specification shall preferably be selected from Table A.2/A.3 respectively Table B.2/B.3.

4 Test and measurement procedures

This clause supplements the information given in clause 4 of EN 130000.

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4.1 Preliminary drying

If prescribed in the detail specification for Style 2 capacitors, the conditions as given in 4.3 of EN 130000 apply.

4.2 Measuring conditions

Capacitors of Style 2 shall be measured at a relative humidity of 25 % to 75 %.

4.3 Mounting

See 4.33 of EN 130000 with the following details:

4.3.1 Mounting conditions

The detail specification shall specify the soldering process to be used and the SMD classification given in 6.2 of CECC 00802.

4.3.2 Final inspection, measurements and requirements

The capacitors shall be visually examined and measured and meet the requirements of annex C.