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JIS C 5101-15 : 1998

**Fixed capacitors for use in
electronic equipment Part 15:
Sectional specification: Fixed
tantalum capacitors with non-solid
or solid electrolyte**

ICS 31.060.40

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of International Trade and Industry through deliberations at Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law:

By this Standard, **JIS C 5142 : 1991** *Fixed tantalum electrolytic capacitors with solid electrolyte for use in electronic equipment* was withdrawn and replaced.

Attention shall be drawn to the possibility that a part of this Standard may conflict with a patent right, application for a patent right after opening to the public, utility model right (including those applied before 1993-12-31) or application for registration of utility model after opening to the public which have technical properties. The Minister of International Trade and Industry and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent right after opened, utility model right or application for registration of utility model after opening to the public which have the technical properties of this kind.

Group standards The following standards form the specifications for the group of element specified in this Standard.

JIS C 5101	<i>General rules of fixed capacitors for use in electronic equipment</i>
JIS C 5101-1	<i>Part 1: Generic specification</i>
JIS C 5101-2	<i>Part 2: Sectional specification: Fixed metallized polyethylene-terephthalate film dielectric d.c. capacitors</i>
JIS C 5101-2-1	<i>Part 2: Blank detail specification: Fixed metallized polyethylene-terephthalate film dielectric d.c. capacitors. Assessment level E</i>
JIS C 5101-3	<i>Part 3: Sectional specification: Fixed tantalum chip capacitors</i>
JIS C 5101-3-1	<i>Part 3: Blank detail specification: Fixed tantalum chip capacitors. Assessment level E</i>
JIS C 5101-4	<i>Part 4: Sectional specification: Aluminium electrolytic capacitors with solid and non-solid electrolyte</i>
JIS C 5101-4-1	<i>Part 4: Blank detail specification: Aluminium electrolytic capacitors with non solid electrolyte. Assessment level E</i>
JIS C 5101-4-2	<i>Part 4: Blank detail specification: Aluminium electrolytic capacitors with solid electrolyte. Assessment level E</i>
JIS C 5101-8	<i>Part 8: Sectional specification: Fixed capacitors of ceramic dielectric, Class 1</i>
JIS C 5101-8-1	<i>Part 8: Blank detail specification: Fixed capacitors of ceramic dielectric, class 1. Assessment level E</i>
JIS C 5101-9	<i>Part 9: Sectional specification: Fixed capacitors of ceramic dielectric, Class 2</i>
JIS C 5101-9-1	<i>Part 9: Blank detail specification: Fixed capacitors of ceramic dielectric, class 2. Assessment level E</i>
JIS C 5101-10	<i>Part 10: Sectional specification: Fixed multilayer ceramic chip capacitors</i>
JIS C 5101-10-1	<i>Part 10: Blank detail specification: Fixed multilayer ceramic chip capacitors. Assessment level E</i>

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- JIS C 5101-11 *Part 11: Sectional specification: Fixed polyethylene-terephthalate film dielectric metal foil d.c. capacitors*
- JIS C 5101-11-1 *Part 11: Blank detail specification: Fixed polyethylene-terephthalate film dielectric metal foil d.c. capacitors. Assessment level E*
- JIS C 5101-13 *Part 13: Sectional specification: Fixed polypropylene film dielectric metal foil d.c. capacitors*
- JIS C 5101-13-1 *Part 13: Blank detail specification: Fixed polypropylene film dielectric metal foil d.c. capacitors. Assessment level E*
- JIS C 5101-14 *Part 14: Sectional specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*
- JIS C 5101-14-1 *Part 14: Blank detail specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains. Assessment level D*
- JIS C 5101-15 *Part 15: Sectional specification: Fixed tantalum capacitors with non-solid or solid electrolyte*
- JIS C 5101-15-1 *Part 15: Blank detail specification: Fixed tantalum capacitors with non-solid electrolyte and foil electrode. Assessment level E*
- JIS C 5101-15-2 *Part 15: Blank detail specification: Fixed tantalum capacitors with non-solid electrolyte and porous anode. Assessment level E*
- JIS C 5101-15-3 *Part 15: Blank detail specification: Fixed tantalum capacitors with solid electrolyte and porous anode. Assessment level E*
- JIS C 5101-16 *Part 16: Sectional specification: Fixed metallized polypropylene film dielectric d.c. capacitors*
- JIS C 5101-16-1 *Part 16: Blank detail specification: Fixed metallized polypropylene film dielectric d.c. capacitors. Assessment level E*
- JIS C 5101-17 *Part 17: Sectional specification: Fixed metallized polypropylene film dielectric a.c. and pulse capacitors*
- JIS C 5101-17-1 *Part 17: Blank detail specification: Fixed metallized polypropylene film dielectric a.c. and pulse capacitors. Assessment level E*
- JIS C 5101-18 *Part 18: Sectional specification: Fixed aluminium electrolytic chip capacitors with solid and non-solid electrolyte*
- JIS C 5101-18-1 *Part 18: Blank detail specification: Fixed aluminium electrolytic chip capacitors with solid electrolyte. Assessment level E*
- JIS C 5101-18-2 *Part 18: Blank detail specification: Fixed aluminium electrolytic chip capacitors with non-solid electrolyte. Assessment level E*
- JIS C 5101-20 *Part 20: Sectional specification: Fixed metallized polyphenylene sulfide film dielectric chip d.c. capacitors*
- JIS C 5101-20-1 *Part 20: Blank detail specification: Fixed metallized polyphenylene sulfide film dielectric chip d.c. capacitors. Assessment level EZ*

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**Fixed capacitors for use
in electronic equipment Part 15 :
Sectional specification :
Fixed tantalum capacitors with
non-solid or solid electrolyte**

Introduction This Japanese Industrial Standard has been prepared based on **IEC 60384-15**, *Fixed capacitors for use in electronic equipment Part 15 : Sectional specification : Fixed tantalum capacitors with non-solid or solid electrolyte* published in 1982 as the first edition, Amendment 1 : 1987 and Amendment 2 : 1992 without modifying their technical contents.

The portions with dotted underlines show the matters not included in the original International Standard. The **IEC** standard number is based on the new numbering system of **IEC** standards put in force on January 1st, 1997, and the standard published before the said date is numbered by adding 60000 to the former number. This is only the change in the numbering system and the contents remain unchanged.

Section One—General

1 General

1.1 Scope This Standard is a sectional specification associated with the generic specification **JIS C 5101-1**, and applies to polar and bipolar tantalum electrolyte capacitors with solid and non-solid electrolyte for use in electronic equipment.

It comprises capacitors for long-life applications and capacitors for general-purpose applications. Capacitors for special purpose application may need additional requirements.

This standard covers three basic sub-families, namely:

Sub-family 1 : Fixed non-solid electrolyte tantalum capacitors with foil electrode

1A : Plain foil electrode

1B : Etched foil electrode

Sub-family 2 : Fixed non-solid electrolyte tantalum capacitors with porous anode

Sub-family 3 : Fixed solid electrolyte tantalum capacitors with porous anode

Remarks : The International Standard corresponding to this Standard is given below.

IEC 60384-15 : 1982 *Fixed capacitors for use in electronic equipment Part 15 : Sectional specification : Fixed tantalum capacitors with non-solid or solid electrolyte*, Amendment 1 : 1987 and Amendment 2 : 1992

1.2 Object The object of this Standard is to prescribe preferred ratings and characteristics and to select from **JIS C 5101-1**, 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 shall be of equal or higher performance level, because lower performance levels are not permitted.

1.3 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. If the indication of the year of coming into effect is given to these referred standards, only the edition of indicated year constitutes the provision of this Standard but the revision and amendment made thereafter are not applied. The normative references without the indication of the year of coming into effect apply limiting only to the most recent edition (including the amendment).

JIS C 0010 : 1993 *Environmental testing Part 1 : General and guidance*

Remarks : All the matters cited from **IEC 60068-1 : 1978**, *Basic environmental testing procedures Part 1 : General* are equivalent to the corresponding matters stated in the said Standard.

JIS C 0010 : 1993 is identical with **IEC 60068-1 : 1988** and Amendment 1 : 1992.

JIS C 5063 *Preferred number series for resistors and capacitors*

Remarks : **IEC 60063 : 1963**, *Preferred number series for resistors and capacitors*, Amendment 1 : 1967 and Amendment 2 : 1977 are identical with the said Standard.

JIS C 5101-1 *Fixed capacitors for use in electronic equipment Part 1 : Generic specification*

Remarks : All the matters cited from **IEC 60384-1 : 1982**, *Fixed capacitors for use in electronic equipment Part 1 : Generic specification*, Amendment 2 : 1987, Amendment 3 : 1989 and Amendment 4 : 1992 are equivalent to the corresponding matters stated in the said Standard.

JIS Z 8601 *Preferred numbers*

Remarks : All the matters cited from **ISO 3 : 1973**, *Preferred numbers—Series of preferred numbers* are equivalent to the corresponding matters stated in the said Standard.

IEC QC 001001 : 1986 *Basic rules of the IEC quality assessment system for electronic components (IECQ) Amendment 2 : 1994*

IEC QC 001002 : 1986 *Rules of procedure of the IEC quality assessment system for electronic components (IECQ) Amendment 2 : 1994*

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 sub-clause 1.9 of the detail specification and indicated in the test schedules, for example by an asterisk (*).

Remarks : The information given in sub-clause 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 Rating 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 sub-clause 2.2.1.

Remarks : In the case of IEC Quality Assessment System (IECQ), when products approved to the detail specification may 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 sub-clause 1.6 of this sectional specification, shall be specifically stated.

1.5 Terminology In addition to the applicable terms and definitions of **JIS C 5101-1** the following definitions apply:

1.5.1 capacitance of an electrolytic capacitor The capacitance of an equivalent circuit having capacitance and resistance in series measured with alternating current of approximately sinusoidal waveform of the specified frequency.

1.5.2 long-life grade capacitors Capacitors intended for applications where a high degree of stability of characteristics over a long life is essential.

The materials are so chosen and manufacture so carried out that improved performance is obtained with consequent increase in life.

1.5.3 general-purpose grade capacitors Capacitors intended for applications where the high performance level of long-life grade capacitors is not required.

1.5.4 rated voltage (U_R) The maximum direct voltage which may be applied continuously to the terminations of a capacitor at the rated temperature.

Remarks 1 The sum of the direct voltage and the peak alternating voltage applied to the capacitor shall not exceed the rated voltage.

2 For short periods, however, the rated voltage may be exceeded (see sub-clauses 2.2.6 and 4.13).

1.6 Marking According to sub-clause 2.4 of **JIS C 5101-1**, 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) rated capacitance;
- b) rated voltage (d.c. voltage may be indicated by the symbol $\equiv$ or —);
- c) category voltage and category temperatures (for long-life grade capacitors only) (if applicable);
- d) polarity of the terminations:

Polar capacitors shall be marked with a positive sign near the positive terminations.

Bipolar capacitors shall be marked positive at both ends and, if space permits, in addition with the letters "BP";

- e) tolerance on rated capacitance;
- f) reference to the grade. (For long-life grade capacitors only).

The abbreviation "LL" may be used for marking purposes;

- g) year and month (or week) of manufacture;
- h) manufacturer's name or trade mark;
- i) indication of the sub-family (e.g. 1, 2 or 3);

- j) climatic category;
- k) manufacturer's type designation;
- l) reference to the detail specification.

1.6.2 The capacitor shall be clearly marked with **a)**, **b)** and **d)** above 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 The package containing the capacitor(s) shall be clearly marked with all the information listed in sub-clause **1.6.1**.

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

Section Two—Preferred ratings and characteristics

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 clause 8 of **JIS C 0010**.

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: $+85^{\circ}\text{C}$, $+100^{\circ}\text{C}$ and $+125^{\circ}\text{C}$

Duration of the damp heat, steady state test: 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 capacitance (C_R) Preferred values of rated capacitance are chosen from the E3 series of **JIS C 5063** and their decimal multiples. If other values are needed, they shall preferably be chosen from the E6 series.

2.2.2 Tolerance on rated capacitance Preferred values of tolerances on rated capacitance are:

Solid electrolyte capacitors	Non-solid electrolyte capacitors
$\pm 5\%$	$\pm 10\%$
$\pm 10\%$	$\pm 20\%$
$\pm 20\%$	$-10/+30\%$
	$-10/+50\%$