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(IEC 60384-17 : 2005)

(JEITA)

**Fixed capacitors for use in
electronic equipment—Part 17:
Sectional specification:
Fixed metallized polypropylene film
dielectric a.c. and pulse capacitors**

ICS 31.060.30

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Electronics and Information Technology Industries Association (JEITA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS C 5101-17:2000** is replaced with this Standard.

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Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

JIS C 5101 consists of the following 43 parts under the general title “*Fixed capacitors for use in electronic equipment*”:

JIS C 5101-1 *Part 1: Generic specification*

JIS C 5101-2 *Part 2: Sectional specification: Fixed metallized polyethylene-terephthalate film dielectric d.c. capacitors*

JIS C 5101-2-1 *Part 2-1: Blank detail specification: Fixed metallized polyethylene-terephthalate film dielectric d.c. capacitors—Assessment levels E and EZ*

JIS C 5101-3 *Part 3: Sectional specification: Fixed tantalum chip capacitors*

JIS C 5101-3-1 *Part 3: Blank detail specification: Fixed tantalum chip capacitors Assessment level E*

JIS C 5101-4 *Part 4: Sectional specification: Aluminium electrolytic capacitors with solid and non-solid electrolyte*

JIS C 5101-4-1 *Part 4: Blank detail specification: Aluminium electrolytic capacitors with non-solid electrolyte Assessment level E*

JIS C 5101-4-2 *Part 4: Blank detail specification: Aluminium electrolytic capacitors with solid electrolyte Assessment level E*

JIS C 5101-8 *Part 8: Sectional specification: Fixed capacitors of ceramic dielectric, Class 1*

JIS C 5101-8-1 *Part 8-1: Blank detail specification: Fixed capacitors of ceramic dielectric, Class 1 Assessment level EZ*

JIS C 5101-9 *Part 9: Sectional specification: Fixed capacitors of ceramic dielectric, Class 2*

JIS C 5101-9-1 *Part 9-1: Blank detail specification: Fixed capacitors of ceramic dielectric, Class 2 Assessment level EZ*

- 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 13-1: Blank detail specification—Fixed polypropylene film dielectric metal foil d.c. capacitors—Assessment levels E and EZ*
- 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 14-1: Blank detail specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains—Assessment level D*
- JIS C 5101-14-2 *Part 14-2: Blank detail specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains—Safety tests only*
- JIS C 5101-14-3 *Part 14-3: Blank detail specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains—Assessment level DZ*
- 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 16-1: Blank detail specification: Fixed metallized polypropylene film dielectric d.c. capacitors—Assessment levels E and EZ*
- JIS C 5101-17 *Part 17: Sectional specification: Fixed metallized polypropylene film dielectric a.c. and pulse capacitors*
- JIS C 5101-17-1 *Part 17-1: Blank detail specification: Fixed metallized polypropylene film dielectric a.c. and pulse capacitors—Assessment levels E and EZ*
- JIS C 5101-18 *Part 18: Sectional specification: Fixed aluminium electrolytic chip capacitors with solid (MnO₂) and non-solid electrolyte*
- JIS C 5101-18-1 *Part 18: Blank detail specification: Fixed aluminium electrolytic chip capacitors with solid (MnO₂) 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*
- JIS C 5101-21 *Part 21: Sectional specification: Fixed surface mount multilayer capacitors of ceramic dielectric, Class 1*
- JIS C 5101-21-1 *Part 21-1: Blank detail specification: Fixed surface mount multilayer capacitors of ceramic dielectric, Class 1—Assessment level EZ*
- JIS C 5101-22 *Part 22: Sectional specification: Fixed surface mount multilayer capacitors of ceramic dielectric, Class 2*
- JIS C 5101-22-1 *Part 22-1: Blank detail specification: Fixed surface mount multilayer capacitors of ceramic dielectric, Class 2—Assessment level EZ*
- JIS C 5101-23 *Part 23: Sectional specification—Fixed surface mount metallized polyethylene naphthalate film dielectric DC capacitors*
- JIS C 5101-23-1 *Part 23-1: Blank detail specification—Fixed surface mount metallized polyethylene naphthalate film dielectric DC capacitors—Assessment level EZ*
- JIS C 5101-24 *Part 24: Sectional specification—Surface mount fixed tantalum electrolytic capacitors with conductive polymer solid electrolyte (to be published)*
- JIS C 5101-24-1 *Part 24-1: Blank detail specification—Surface mount fixed tantalum electrolytic capacitors with conductive polymer solid electrolyte—Assessment level EZ (to be published)*
- JIS C 5101-25 *Part 25: Sectional specification—Surface mount fixed aluminium electrolytic capacitors with conductive polymer solid electrolyte (to be published)*
- JIS C 5101-25-1 *Part 25-1: Blank detail specification—Surface mount fixed aluminium electrolytic capacitors with conductive polymer solid electrolyte—Assessment level EZ (to be published)*

Fixed capacitors for use in electronic equipment—Part 17: Sectional specification: Fixed metallized polypropylene film dielectric a.c. and pulse capacitors

Introduction

This Japanese Industrial Standard has been prepared based on the second edition of **IEC 60384-17** published in 2005 without modifying the technical contents.

The portions with continuous side lines or dotted underlines are the matters not stated in the original International Standard.

1 General

1.1 Scope

This Standard is a sectional specification associated with the generic specification **JIS C 5101-1** and applies to fixed metallized polypropylene film dielectric a.c. and pulse capacitors for use in electronic equipment (hereafter referred to as “capacitors”). It covers fixed capacitors with metallized electrodes and polypropylene dielectric for use in electronic equipment.

NOTE 1 Capacitors which have mixed foil and metallized electrodes are also within the scope of this Standard.

These capacitors may have “self-healing” properties depending on conditions of use.

Capacitors covered by this Standard are mainly intended for use with alternating voltage and/or for pulse applications. The maximum reactive power applicable is 10 000 var and the maximum peak voltage is 3 000 V.

Capacitors for reactive power exceeding 500 var and to which a maximum peak voltage of 2 500 V at 50 Hz can be applied are not covered by this Standard, except when they are the highest part of a range of reactive power mainly situated below 500 var at 50 Hz.

This Standard is not intended to cover capacitance values higher than 20 μ F.

Two performance grades of capacitors are covered, Grade 1 for long-life application and Grade 2 for general application.

Capacitors for electromagnetic interference suppression are not included, but are covered by **JIS C 5101-14**.

Capacitors for electrical shock hazard protection (covered by **IEC 60065**) and fluorescent lamp and motor capacitors are also excluded.

NOTE 2 The International Standard corresponding to this Standard is as follows.

IEC 60384-17:2005 *Fixed capacitors for use in electronic equipment—Part 17: Sectional specification: Fixed metallized polypropylene film dielectric a.c. and pulse capacitors* (IDT)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

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 an 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 text, constitute provisions of this Standard. For standards with the year indication, only the editions of the indicated year shall apply but the revisions (including amendments) made thereafter shall not apply. The normative reference without the indication of the year shall apply only to the most recent edition (including amendments).

JIS C 5063:1997 Preferred number series for resistors and capacitors

NOTE : Corresponding International Standard: IEC 60063:1963 *Preferred number series for resistors and capacitors*, Amendment 1:1967 and Amendment 2:1977 (IDT)

JIS C 5101-1:1998 *Fixed capacitors for use in electronic equipment Part 1: Generic specification*

NOTE : Corresponding International Standard: 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 (MOD)

In addition, **JIS C 5101-1**:1998 does not correspond to the latest edition, **IEC 60384-1**:1999, so the numbering system of applicable items may not correspond with each other. In the case of deviating the numbering, the number of **IEC 60384-1**:1999 is shown in NOTE.

JIS C 5101-17-1:2009 *Fixed capacitors for use in electronic equipment—Part 17-1: Blank detail specification: Fixed metallized polypropylene film dielectric a.c. and pulse capacitors—Assessment levels E and EZ*

NOTE : Corresponding International Standard: IEC 60384-17-1:2005 *Fixed capacitors for use in electronic equipment—Part 17-1: Blank detail specification: Fixed metallized polypropylene film dielectric a.c. and pulse capacitors—Assessment levels E and EZ* (IDT)

JIS C 60068-1:1993 *Environmental testing Part 1: General and guidance*

NOTE : Corresponding International Standard: IEC 60068-1:1988 *Environmental testing—Part 1: General and guidance* and Amendment 1:1992 (IDT)

JIS Z 8601:1954 *Preferred numbers*

NOTE : Corresponding International Standard: ISO 3:1973 *Preferred numbers—Series of preferred numbers* (MOD)

JIS Z 9015-1 *Sampling procedures for inspection by attributes—Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

NOTE : Corresponding International Standard: IEC 60410 : 1973 *Sampling plans and procedures for inspection by attributes* (MOD)

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 (**JIS C 5101-1**), sectional (this Standard) or blank detail specification (**JIS C 5101-17-1**). 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.

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 Standard, together with the following:

1.4.3.1 Rated capacitance range

See **2.2.1**.

NOTE : In the case of International Electrotechnical Commission Quality Assessment System for Electronic Components (IECQ), 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 Sinusoidal current (if applicable)

The detail specification shall state the derating curve of the sinusoidal current versus temperature with reference to 70 °C, and the derating curve of the sinusoidal current versus frequency and of the sinusoidal current versus capacitance.

NOTE : “If applicable” means that the test is applied to where applicable.

1.4.3.3 Particular characteristics

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

1.4.3.4 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 from **1.6** 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 **JIS C 5101-1** and the following apply.

1.5.1 Performance grades

classification which expresses the stability related to the characteristics of capacitors

NOTE : It is classified into performance grades 1 and 2.

1.5.1.1 performance grade 1 capacitors (long-life)

capacitors intended for long-life applications with stringent requirements for the electrical parameters

1.5.1.2 performance grade 2 capacitors (general purpose)

capacitors for general application where the stringent requirements of performance grade 1 are not necessary

1.5.2 stability grade

capacitance drift after climatic and mechanical tests and after endurance tests.

NOTE : The performance grade and the stability grade must be noted in the detail specification

1.5.3 performance grade and stability grade combinations (if stability grade is required for a.c. and pulse capacitors)

see the table below for preferred values:

Table 1 Preferred values

Performance grades	Stability grades	Combination designations
1	1	1.1
	2	1.2
2	—	2

The three combinations concern capacitance stability and $\tan \delta$ values. Distinction in performance of the three combinations is shown in table 4.

1.5.4 rated voltages

maximum voltage which may be applied continuously to a capacitor at the rated temperature

Any one of rated d.c. voltage, rated a.c. voltage or rated pulse voltage is applied.

NOTE : The sum of the d.c. voltage and the peak a.c. voltage or the peak pulse voltage applied to the capacitor must not exceed the rated voltage. The value of the peak a.c. voltage allowed at different frequencies is under consideration.

1.5.4.1 rated d.c. voltage

maximum d.c. voltage which may be applied continuously to a capacitor at the rated temperature

1.5.4.2 rated a.c. voltage

maximum r.m.s. alternating voltage which may be applied continuously to a capacitor at the rated temperature and at a given frequency

1.5.4.3 rated pulse voltage

peak value of the pulse voltage which may be applied continuously to a capacitor at the rated temperature and at a given frequency

1.5.5 rated voltage pulse slope $(dU)/(dt)_R$ (if applicable)

maximum admissible value of the voltage slope dU/dt of a pulse, at the rated temperature at such a repetition frequency that no significant increase of temperature occurs

NOTE : "If applicable" means that the test is applied to where applicable.

1.6 Marking

See 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 a.c. and/or pulse voltage (a.c. voltage may be indicated by the symbol ~) and the corresponding frequency if different from 50 Hz;
- c) tolerance on rated capacitance;
- d) rated voltage pulse slope (if applicable);
- e) rated current and corresponding frequency (if applicable);
- f) year and month (or week) of manufacture;
- g) manufacturer's name or its trade mark;
- h) climatic category;
- i) manufacturer's type designation;
- j) reference to the detail specification.

1.6.2 The capacitor shall be clearly marked with **a)**, **b)** and **c)** 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 **1.6.1**.

1.6.4 Any addition 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 Standard are classified into climatic categories according to the general rules given in clause 8 of JIS C 60068-1.

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

Lower category temperature: -55 °C, -40 °C, -25 °C and -10 °C

Upper category temperature: +70 °C, +85 °C; +100 °C and +105 °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.

NOTE : The test conditions of damp heat (steady state) shall be the temperature of 40 °C and the relative humidity of 90 % to 95 %.