

JIS

JAPANESE INDUSTRIAL STANDARD

**Fixed tantalum electrolytic
chip capacitors with solid
electrolyte for use in
electronic equipment**

JIS C 5143—1991

Translated and Published

by

Japanese Standards Association

Printed in Japan

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

Contents

	Page
1. Scope	1
2. Definitions	2
3. Type designation	2
3.1 Structure of type designation	2
3.2 Symbol	2
4. Ratings	6
4.1 Rated temperature and category temperature range	6
4.2 Rated voltage, surge voltage and category voltage	6
4.3 Nominal capacitance	7
4.4 Tolerance on capacitance	7
4.5 Combinations of rated voltage and nominal capacitance for each characteristics and for each grades	7
5. Performance and test methods	7
5.1 Test method	7
5.2 Performance	7
6. Construction	21
7. Appearance, dimension and marking	21
7.1 Appearance	21
7.2 Style and dimension	21
7.3 Marking	21
8. Quality evaluation and its assurance	21
9. Packaging	21
10. Marking	21
10.1 Marking for product	21
10.2 Marking for package	23
Attached Fig. 1 Outside dimension	24
Attached Table 1 Combinations of rated voltage and nominal capacitance of CS772HB	25
Attached Table 2 Combinations of rated voltage and nominal capacitance of CS772SB	26
Attached Table 3 Combinations of rated voltage and nominal capacitance of Grades E and X of CS772LB	27
Annex 1 Soldering heat resistance test method	28
Annex 2 Setting method to testing board	30

	Page
Annex 3 Adherence test method	33
Annex 4 Resistance to board bending test method	35
Annex 5 Procedure of quality assurance	37
Annex 6 Qualification approval test	38
Annex 7 Failure rate approval test	42
Annex 8 Quality assurance inspection	43
Annex 9 Periodic approval maintenance test	46

JAPANESE INDUSTRIAL STANDARD

J I S

Fixed tantalum electrolytic chip capacitors with C 5143-1991
solid electrolyte for use in
electronic equipment

1. Scope

This Japanese Industrial Standard specifies based on JIS C 5140, the polar type fixed tantalum solid electrolytic chip capacitors which employ tantalum oxide films as the dielectrics and for use mainly in electronic equipment d.c. circuits, hereinafter referred to as the "capacitors".

Remarks 1. The following standards are cited in this Standard:

JIS C 0806-Packaging of Electronic Components on Continuous
Tapes (Surface Mounting Devices)

JIS C 5101-General Rules of Fixed Capacitors for Electronic
Equipment

JIS C 5102-Test Methods of Fixed Capacitors for Electronic
Equipment

JIS C 5140-General Rules of Fixed Electrolytic Capacitors
for Electronic Equipment

JIS C 6484-Copper-Clad Laminates for Printed Wiring Boards
-Glass Fabric Base, Epoxy Resin

JIS K 5902-Colophonium

JIS K 8101-Ethanol (99.5) [Ethyl Alcohol (99.5)]

JIS K 8839-2-Propanol

JIS Z 3282-Soft Solder

JIS Z 9015-Sampling Inspection Procedures and Tables by
Attributes with Severity Adjustment (Receiving
Inspection where A Consumer Can Select Suppliers)

2. Corresponding International Standards are as follows:

IEC 384-3 (1989) Fixed capacitors for use in electronic
equipment
Part 3: Sectional specification:
Fixed tantalum chip capacitors

IEC 384-3-1 (1989) Fixed capacitors for use in electronic
equipment
Part 3: Blank detail specification:
Fixed tantalum chip capacitors.
Assessment level E

2. Definitions

The principal definitions for this Standard are those specified in JIS C 5140.

3. Type designation

3.1 Structure of type designation The type designation shall be structured as shown in the following arrangements:

Symbol denot- ing class of capaci- tors 3.2.1	Symbol denot- ing style 3.2.2	Symbol denoting charac- teristic 3.2.3	Symbol denot- ing rated voltage 3.2.4	Symbol denot- ing nominal capaci- tance 3.2.5	Symbol denoting- tolerance on capaci- tance 3.2.6	Symbol denot- ing grade 3.2.7
Example: CS	772	SB	1V	475	M	E
Symbol denot- ing failure rate level 3.2.8	Symbol denot- ing outside dimen- sion 3.2.9	Symbol denoting taping 3.2.10				
Example: M	6032	T				

3.2 Symbol

3.2.1 Class of capacitors The symbol denoting class of capacitors shall be CS.

3.2.2 Style The symbol denoting style shall comply with Table 1.

Table 1. Style

Symbol	Outside style	Enclosure	Terminal	Note
772	Square-shaped chip	Non-metallic case (Resin molded)	Surface mounted terminal	Terminals extending over the side and bottom surface

Remarks: 2, the third numeral of style symbol 772, expresses the terminal extending over side and bottom surfaces.

3.2.3 Characteristics The symbol denoting characteristics shall be expressed by 2 capital letters which are the combination of a symbol denoting performance and a symbol denoting the category temperature range, and shown in Table 2.

Table 2. Characteristics

Item		Characteristic symbol		
		HB	SB	LB
Per- for- mance	Impedance	①	①	-
	Resistance to soldering heat	①	②	③
	Temperature cycle (2)	①	②	-
	Resistance to damp (steady state)	①	②	③
Category temperature range °C		-55 to +125		
Contents		Capacitor, performance of which is more stable for longer time than that of general use.	Capacitor for general use.	Capacitor, performance of which is lower and has larger capacitance than that of general use.

- Remarks
1. The performance of each characteristic, except for the items listed in the Table, will be different in the items as leakage current, variation of capacitance, dissipation factor and variation of characteristics after test (Refer Table 10).
 2. The numerals "① ② ③" in the Table, represent the order of severity of each item, and that order is ③ ② ① in severity.
 3. By the characteristics, the test conditions in resistance to soldering heat, temperature cycle (2), and resistance to damp (steady state), are different.

3.2.4 Rated voltage The symbol denoting the rated voltage shall comply with Table 3.

Table 3. Rated voltage

Symbol	Rated voltage V
OG	4.0
OJ	6.3
1A	10
1C	16
1D	20
1E	25
1V	35
1H	50

3.2.5 Nominal capacitance The symbol denoting nominal capacitance shall consist of 3 numerals in the unit of picofarad (pF). The 1st and 2nd numerals are the significant figure of nominal capacitance, and the 3rd numeral is the number of following zeros.

Example: 104 100000 pF (0.10 μ F)
 475 4700000 pF (4.7 μ F)
 336 33000000 pF (33 μ F)
 107 100000000 pF (100 μ F)

3.2.6 Tolerances on capacitance The symbol denoting tolerances on capacitance shall comply with Table 4.

Table 4. Tolerances on capacitance

Symbol	Tolerances on capacitance %
K	± 10
M	± 20

3.2.7 Grade The symbol denoting grade shall comply with Table 5. And, the combinations of this grade and characteristic shall comply with Table 6.

Table 5. Grade

Symbol	Content of grade
E	Requires quality evaluation and its level is general level II.
X	Not specify quality evaluation.

Remarks: General level II corresponds to Assessment level E in IEC 384-3-1.

Table 6. Combinations of grade and characteristic

Grade symbol	Characteristic symbol		
	HB	SB	LB
E	○	○	○
X	-	-	○

Remarks: In the Table, the mark "○" expresses the application, and "-" the non-application to the grades.

3.2.8 Failure rate level The symbol denoting the failure rate level shall comply with Table 7.

Table 7. Failure rate level

Symbol	Failure rate % / 1000 h	Applicable grade
M	1.0	E
P	0.1	
R	0.01	
X	Not specified	E, X

3.2.9 Outside dimension The symbol denoting outside dimension (hereafter referred to as dimension symbol) shall consist of 4 numerals and comply with Attached Fig. 1.

3.2.10 Taping The symbol denoting taping shall be T, and be applied in the case of taping products.

4. Ratings

4.1 Rated temperature and category temperature range The rated temperature shall be 85°C, and the category temperature range shall be -55 to +125°C.

4.2 Rated voltage, surge voltage and category voltage The rated voltage shall be as Table 3, and the corresponding surge voltage and category voltage shall comply with Table 8.

Table 8. Surge voltage and category voltage corresponding to rated voltage

Unit: V

Rated voltage		Surge voltage	Category voltage (Temperature reduced voltage at 125°C)	Surge voltage at 125°C
Symbol	Voltage			
OG	4.0	5.0	2.5	3.2
OJ	6.3	8.0	4.0	5.0
1A	10	13	6.3	8.0
1C	16	20	10	13
1D	20	26	13	16
1E	25	32	16	20
1V	35	44	22	28
1H	50	63	32	40

Remarks 1. The temperature reduced voltages at optional temperature over the rated temperature (85°C) (however, maximum shall be 125°C), or corresponding surge voltage shall be calculated by the following formula.

And, the figure below the second place of decimals shall be omitted.

$$U_T = U_r - \frac{U_r - U_d}{40} (T - 85)$$

where, U_T : temperature reduced voltage or corresponding surge voltage at optional temperature (V)

U_r : rated voltage or corresponding surge voltage (V)

U_d : category voltage or corresponding surge voltage at 125°C (V)

T : optional temperature over the rated temperature (°C)

2. The value of ripple voltages applicable to the capacitors shall be very small.

4.3 Nominal capacitance The nominal capacitance shall be represented by micro-farad (μF), and be 10^n (n is integer) times of E6 numerical progression in Table 9.

Table 9. E6 numerical progression

Progression	Numerals					
E6	1.0	1.5	2.2	3.3	4.7	6.8

4.4 Tolerance on capacitance The tolerance on capacitance shall comply with Table 4.

4.5 Combinations of rated voltage and nominal capacitance for each characteristics and for each grades The combinations of rated voltage and nominal capacitance for each characteristics and for each grades of capacitors shall comply with Attached Fig. 1 to 3.

5. Performance and test methods

5.1 Test method The test methods shall comply with JIS C 5102 and Annex 1 to 4 of this Specification (JIS C 5143).

However, the test methods for taping shall comply with JIS C 0806.

5.2 Performance The performance shall comply with Table 10. However, the performance of taping shall comply with JIS C 0806.

Table 10. Performance and test methods

No.	Item	Character- istics	Performance				Test method (JIS C 5102)	Informative reference (Summary of JIS C 5102)
			HB	SB	LB	E		
1	Leakage current	Less than $0.01 C_R \cdot U_R \mu A$ or $0.5 \mu A$ whichever is larger.		Less than $0.02 C_R \cdot U_R \mu A$ or $1 \mu A$ whichever is larger.	Comply with 7.7. Resistance value of standard resistor in voltage drop method: $1000 \pm 10 \Omega$	Series protective resistor: About $1 k\Omega$. However, resistor less than $1 k\Omega$ may be used, so that supply voltage reaches to rated voltage within 1 min. Supply voltage: Rated voltage Measuring time: 5 min. after reaching to rated voltage. However, it may be judged in shorter time, if it shows under specified value, and further more decreasing or keeping stable.		

Table 10. (Continued)

No.	Item	Character-istics	Performance			Test method (JIS C 5102)	Informative reference (Summary of JIS C 5102)
			HB	SB	LB		
2	Capacitance	Grade	E		E, X	Comply with 7.8. Measuring condition: 4. of Table 10.	Measuring frequency: 120 Hz ±20 % Measuring circuit: Series equivalent circuit. () Measuring voltage: Less than 0.5 Vrms +1.5 to 2.0 VDC. However, if no fear of doubt in judgment, the superposi- tion of DC voltage may be omitted.
		Less than following values.					
3	Dissi-pation factor	Nominal capaci-tance	Within following values.			Comply with 7.9. Measuring condition: 4 of Table 10.	
		1 µF. or less	0.04		0.06		
		1.5 to 68 µF	0.06		0.08		
		100 µF or more	-	0.08	0.1		

Table 10. (Continued)

No.	Item	Performance				Test method (JIS C 5102)	Informative reference (Summary of JIS C 5102)
		Character-istics	HB	SB	LB		
4	Impe- dance (Apply to charac- teris- tics HB and SB	Grade	E		E, X	Comply with 7.11. Measuring circuit: Whichever of (a) (b) and (c) in Fig. 13 may be used. Measuring frequency: 100 kHz $\pm$ 10 %.	Measuring voltage, or current flowing in sample capacitor, shall be the value which has no varia- tion 1 min. continuous application. However, measuring voltage shall not exceed over 0.5 Vrms.
		Case symbol	Less than following values.		-		
		3216	C_R 0.22 max.: 50 Ω C_R 0.33 max.: 20 Ω	C_R 0.33 max.: 50 Ω C_R 0.47 max.: 20 Ω			
		3528	15 Ω				
		6032	7.5 Ω				
		7343	2.5 Ω				
5	Resist- ance to solder- ing heat	Appearance	No remarkable abnormality. Making easily readable.			Comply with Annex 1 of this specification (JIS C 5143).	
		Leakage	Satisfy No. 1.				
		Capaci- tance variation	$\pm$ 3 % of value before test	$\pm$ 5 % of value before test			
		Dissipa- tion factor	Satisfy No. 3				

Remarks: Symbol C_R in the Table, represents nominal capacitance in micro-Farad (μ F) unit, and U_R represents rated voltage in volt (V) unit.

Table 10. (Continued)

No.	Item	Performance				Test method (JIS C 5102)	Informative reference (Summary of JIS C 5102)
		Character-istics					
		HB	SB	LB			
Grade		E		E, X		Comply with 8.4. Test method: Method 1 (Soldering bath method) Immersion in flux: Capacitor shall be totally immersed. Immersion in solder: Total capacitor shall be immersed to 10 mm depth from solder surface. Remarks: Holding and immersion of capacitor comply with Annex 1 Fig. 1 of this specification (JIS C 5143).	Preconditioning (Accelerated aging): Specimen is held upon boiling distilled water for 1 h. Flux: Ethanol solution of rosin (25 wt %). Class of solder: H 60A or H 63A. Temperature of solder: 235 + 5°C. Time of solder immersion: 2 + 0.5 s. Speed of immersion: 25 + 2.5 mm/s.
6	Solderability	3/4 or more of the terminations shall be covered with new solder.					
7	Resistance to board bending	Appearance	No remarkable abnormality.				
		Capacitance	Measuring values shall be stable during the test.				

Table 10. (Continued)

No.	Item	Character-istics	Performance			Test method (JIS C 5102)	Informative reference (Summary of JIS C 5102)
			HB	SB	LB		
		Grade	E		E, X		
8	Setting to testing board	Appearance	No remarkable abnormality. Marking easily readable.			Comply with Annex 2 of this specification (JIS C 5143).	
		Leakage current	Satisfy No. 1.				
		Capacitance variation	± 3 % of value before test.				
		Dissipation factor	Satisfy No. 3.				
		Impedance (Apply to character-istics HB and SB)	Satisfy No. 4.				
9	Adherence		No peeling off of termination.			Comply with Annex 3 of this specification (JIS C 5143).	