

# Chip tantalum capacitors

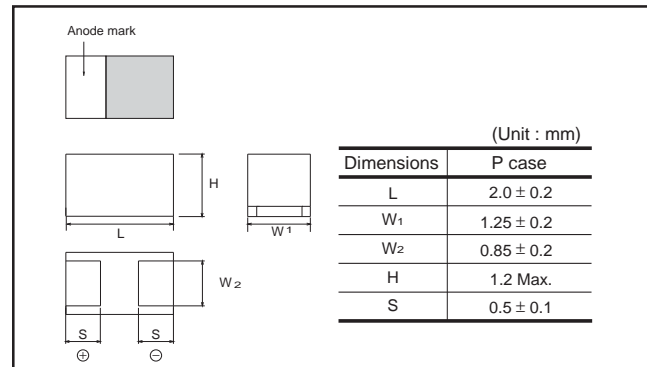
## (New bottom surface electrode type : Large capacitance)

### TCS Series P Case

#### ●Features (P)

- 1) New package construction enables a higher capacitance than conventional products (TCT Series)
- 2) Thin, compact, high capacitance design contributes to smaller, thinner, high performance sets
- 3) Ideal for noise removal on power supply lines with limited space
- 4) Eco-friendly halogen-free products

#### ●Dimensions (Unit : mm)



#### ●Part No. Explanation



① Series name  
TCS

② Case style  
P

③ Rated voltage

Rated voltage (V)	2.5	4	6.3	10	16	20	25
CODE	0E	0G	0J	1A	1C	1D	1E

④ Nominal capacitance  
Nominal capacitance in pF in 3 digits:  
2 significant figures followed by the figure  
representing the number of 0's.

⑤ Capacitance tolerance  
M : ±20%

⑥ Taping  
8 : Reel width : 8mm  
R : Positive electrode on the side opposite to sprocket hole

#### ● Rated table

(μF)	Rated voltage (V.DC)						
	2.5	4	6.3	10	16	20	25
10 (106)						P	*P
15 (156)							
22 (226)					*P		
33 (336)				*P	*P		
47 (476)				P			
68 (686)							
100 (107)			P				
150 (157)			*P				
220 (227)		P					
330 (337)	*P						

Remark) Case size codes (P) in the above show products line-up.

\* Under development

## ● Marking

The indications listed below should be given on the surface of a capacitor.

- (1) Polarity : The polarity should be shown by □ bar. (on the anode side)  
 (2) Rated DC voltage : A voltage code is shown as below table.  
 (3) Capacitance value : A capacitance code is shown as below table.

Voltage Code	Rated DC Voltage (V)
e	2.5
g	4
j	6.3
A	10
C	16
D	20
E	25

Capacitance Code	Capacitance Value (μF)
a	10
e	15
j	22
n	33
s	47
w	68
ā	100
ē	150
j̄	220
n̄	330

Visual typical example (1) voltage code (2) capacitance code

[P case] note 1)  $\frac{g}{(1)}$   $\frac{j̄}{(2)}$

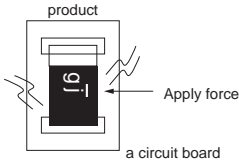


note 2) voltage code and capacitance code are variable with parts number

## ● Characteristics

Item	Performance	Test conditions (based on JIS C 5101-1 and JIS C 5101-3)
Operating Temperature	-55°C to +125°C	Voltage reduction when temperature exceeds +85°C
Maximum operating temperature with no voltage derating	+85°C	
Rated voltage (V.DC)	2.5 4 6.3 10 16 20 25 35	at 85°C
Category voltage (V.DC)	1.6 2.5 4 6.3 10 13 16 22	at 125°C
Surge voltage (V.DC)	3.2 5 8 13 20 26 32 44	at 85°C
DC Leakage current	Shall be satisfied the value on "Standard list"	As per 4.9 JIS C 5101-1 As per 4.5.1 JIS C 5101-3 Voltage : Rated voltage for 5min
Capacitance tolerance	Shall be satisfied allowance range. ±20%	As per 4.7 JIS C 5101-1 As per 4.5.2 JIS C 5101-3 Measuring frequency : 120±12Hz Measuring voltage : 0.5Vrms +1.5V.DC Measuring circuit : DC Equivalent series circuit
Tangent of loss angle (Df, tan δ)	Shall be satisfied the value on "Standard list"	As per 4.8 JIS C 5101-1 As per 4.5.3 JIS C 5101-3 Measuring frequency : 120±12Hz Measuring voltage : 0.5Vrms +1.5V.DC Measuring circuit : DC Equivalent series circuit
Impedance / ESR	Shall be satisfied the value on "Standard list"	As per 4.10 JIS C 5101-1 As per 4.5.4 JIS C 5101-3 Measuring frequency : 100±10kHz Measuring voltage : 0.5Vrms or less Measuring circuit : DC Equivalent series circuit
Resistance to Soldering heat	Appearance	There should be no significant abnormality. The indications should be clear.
	L.C.	Less than 200% of initial limit
	ΔC / C	Within ±30% of initial value
	Df (tan δ)	Less than 200% of initial limit
		As per 4.14 JIS C 5101-1 As per 4.6 JIS C 5101-3 Dip in the solder bath Solder temp : 260±10°C Duration : 5±0.5s Repetition : 1 After the specimens, leave it at room temperature for over 24h and then measure the sample.

Item		Performance	Test conditions (based on JIS C 5101-1 and JIS C 5101-3)															
Temperature cycle	Appearance	There should be no significant abnormality. The indications should be clear.	As per 4.16 JIS C 5101-1 As per 4.10 JIS C 5101-3 Repetition : 5 cycles (1 cycle : steps 1 to 4) without discontinuation. <table><tr><td></td><td>Temp.</td><td>Time</td></tr><tr><td>1</td><td>-55±3°C</td><td>30±3min.</td></tr><tr><td>2</td><td>Room temp.</td><td>3min. or less</td></tr><tr><td>3</td><td>125±2°C</td><td>30±3min.</td></tr><tr><td>4</td><td>Room temp.</td><td>3min. or less</td></tr></table> After the specimens, leave it at room temperature for over 24h and then measure the sample.		Temp.	Time	1	-55±3°C	30±3min.	2	Room temp.	3min. or less	3	125±2°C	30±3min.	4	Room temp.	3min. or less
		Temp.		Time														
	1	-55±3°C		30±3min.														
	2	Room temp.		3min. or less														
3	125±2°C	30±3min.																
4	Room temp.	3min. or less																
L.C.	Less than 200% of initial limit																	
ΔC / C	Within ±30% of initial value																	
Df (tan δ)	Less than 200% of initial limit																	
Moisture resistance	Appearance	There should be no significant abnormality. The indications should be clear.	As per 4.22 JIS C 5101-1 As per 4.12 JIS C 5101-3 After leaving the sample under such atmospheric condition that the temperature and humidity are 60±2°C and 90 to 95% RH, respectively, for 500±12h leave it at room temperature for over 24h and then measure the sample.															
	L.C.	Less than 200% of initial limit																
	ΔC / C	Within ±30% of initial value																
	Df (tan δ)	Less than 200% of initial limit																
Temperature Stability	Temp.	-55°C	As per 4.29 JIS C 5101-1 As per 4.13 JIS C 5101-3															
	ΔC / C	Within 0/-30% of initial value																
	Df (tan δ)	Shall be satisfied the value on " Standard list "																
	L.C.	—																
	Temp.	+85°C																
	ΔC / C	Within +15/-5% of initial value																
	Df (tan δ)	Shall be satisfied the value on " Standard list "																
	L.C.	Less than 1000% of initial limit																
	Temp.	+125°C																
	ΔC / C	Within +20/-5% of initial value																
	Df (tan δ)	Shall be satisfied the value on " Standard list "																
	L.C.	Less than 1250% of initial limit																
Surge voltage	Appearance	There should be no significant abnormality. The indications should be clear.	As per 4.26JIS C 5101-1 As per 4.14JIS C 5101-3 Apply the specified surge voltage via the serial resistance of 1kΩ every 5±0.5 min. for 30±5 s. each time in the atmospheric condition of 85±2°C. Repeat this procedure 1,000 times. After the specimens, leave it at room temperature for over 24h and then measure the sample.															
	L.C.	Less than 200% of initial limit																
	ΔC / C	Within ±30% of initial value																
	Df (tan δ)	Less than 200% of initial limit																
Loading at High temperature	Appearance	There should be no significant abnormality. The indications should be clear.	As per 4.23 JIS C 5101-1 As per 4.15 JIS C 5101-3 After applying the rated voltage for 1000+36/0 h without discontinuation via the serial resistance of 3Ω or less at a temperature of 85±2°C, leave the sample at room temperature / humidity for over 24h and measure the value.															
	L.C.	Less than 200% of initial limit																
	ΔC / C	Within ±30% of initial value																
	Df (tan δ)	Less than 200% of initial limit																
Terminal strength	Capacitance	The measured value should be stable.	As per 4.35 JIS C 5101-1 As per 4.9 JIS C 5101-3 A force is applied to the terminal until it bends to 1mm and by a prescribed tool maintain the condition for 5s. (See the figure below) 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Item		Performance	Test conditions (JIS C 5101-1 and JIS C 5101-3)
Adhesiveness		The terminal should not come off.	<p>As per 4.34 JIS C 5101-1 As per 4.8 JIS C 5101-3 Apply force of 5N in the two directions shown in the figure below for 10±1s after mounting the terminal on a circuit board.</p> 
Dimensions		Refer to "External dimensions"	Measure using a caliper of JIS B 7507 Class 2 or higher grade.
Resistance to solvents		The indication should be clear	<p>As per 4.32 JIS C 5101-1 As per 4.18 JIS C 5101-3 Dip in the isopropyl alcohol for 30±5s, at room temperature.</p>
Solderability		3/4 or more surface area of the solder coated terminal dipped in the soldering bath should be covered with the new solder.	<p>As per 4.15.2 JIS C 5101-1 As per 4.7 JIS C 5101-3 Dip speed : 25±2.5mm / s Pre-treatment (accelerated aging): Leave the sample on the boiling distilled water for 1 h. Solder temp. : 245±5°C Duration : 3±0.5s Solder : M705 Flux : Rosin 25% IPA 75%</p>
Vibration	Capacitance	Measure value should not fluctuate during the measurement.	<p>As per 4.17 JIS C 5101-1 Frequency : 10 to 55 to 10Hz/min. Amplitude : 1.5mm Time : 2h each in X and Y directions Mounting : The terminal is soldered on a print circuit board.</p>
	Appearance	There should be no significant abnormality.	

● Standard products list, TCS series P case

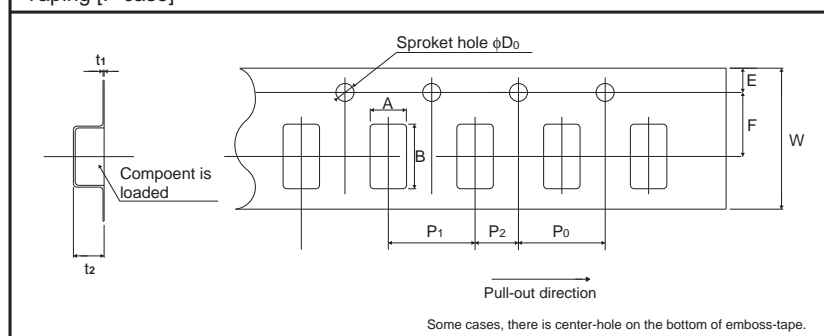
Part No.	Rated voltage 85°C	Category voltage 125°C	Surge voltage 85°C	Cap. 120Hz	Tolerance	Leakage current 25°C	Df 120Hz (%)			IMP 100kHz
	(V)	(V)	(V)	(μF)	(%)	1WV.5min (μA)	-55°C	25°C 85°C	125°C	(Ω)
* TCS P 0E 337 M8R	2.5	1.6	3.2	330	±20	83.0	80	40	60	3.0
TCS P 0G 227 M8R	4	2.5	5	220	±20	88.0	80	40	60	3.0
TCS P 0J 107 M8R	6.3	4	8	100	±20	63.0	80	40	60	3.0
* TCS P 0J 157 M8R	6.3	4	8	150	±20	95.0	80	40	60	3.0
* TCS P 1A 336 M8R	10	6.3	13	33	±20	17.0	60	30	40	4.0
TCS P 1A 476 M8R	10	6.3	13	47	±20	24.0	60	30	40	4.0
* TCS P 1C 226 M8R	16	10	20	22	±20	18.0	60	30	40	4.0
* TCS P 1C 336 M8R	16	10	20	33	±20	27.0	60	30	40	4.0
TCS P 1D 106 M8R	20	13	26	10	±20	10.0	30	20	30	6.0
* TCS P 1E 106 M8R	25	16	32	10	±20	13.0	30	20	30	6.0

\* =Under development

### ● Packaging specifications

Case code	A $\pm$ 0.1	B $\pm$ 0.1	W $\pm$ 0.2	E $\pm$ 0.1	F $\pm$ 0.05	P <sub>1</sub> $\pm$ 0.1	P <sub>2</sub> $\pm$ 0.05	P <sub>0</sub> $\pm$ 0.1	D <sub>0</sub> $\pm$ 0.05	t <sub>1</sub> $\pm$ 0.05	t <sub>2</sub> $\pm$ 0.1
P	1.55	2.30	8.00	1.75	3.50	4.00	2.00	4.00	$\phi$ 1.55	0.25	1.32

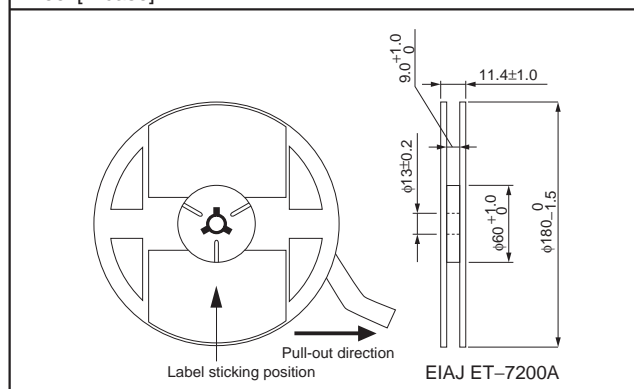
### Taping [P case]



### ● Packaging style

Case code	Packaging	Packaging style	Symbol	Basic ordering units
P case	Taping	plastic taping $\phi$ 180mm Reel	R	3,000pcs

### Reel [P case]



## Notes

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