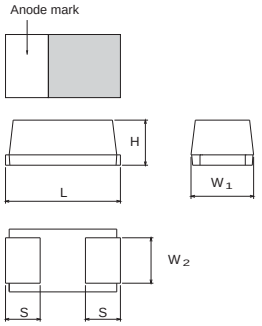
Conductive polymer chip tantalum capacitors (Bottom surface electrode type : Large capacitance)

TCTO Series P Case

●Features (P)

1) Conductive polymer used for the cathode material.
2) Ultra low ESR
3) Small package, but big capacitance
4) Screening by thermal shock

●Dimensions (Unit : mm)



(Unit : mm)

Dimensions	P case
L	2.0±0.2
W1	1.25±0.2
W2	0.85±0.2
H	1.2MAX.
S	0.5±0.2

●Part No. Explanation

T	C	T	O	P	0	G	3	3	6	M	8	R
①				②	③		④			⑤	⑥	

① Series name
TCTO

② Case style
P

③ Rated voltage

Rated voltage (V)	2.5	4	6.3	10
CODE	0E	0G	0J	1A

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 : Tape width
R : Positive electrode on the side opposite to sprocket hole

∗ This specification has possibility of charge, due to underdevelopment product.
Please ask for latest specification to our sales.

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● Rated table

(ESR : mΩ)

(μF)	Rated voltage (V.DC)			
	2.5	4	6.3	10
1.0 (105)				
1.5 (155)				
2.2 (225)				
3.3 (335)				* 500
4.7 (475)				* 500
6.8 (685)				* 500
10 (106)				500
15 (156)				* 500
22 (226)			* 500	
33 (336)		* 500	* 500	
47 (476)	* 500	* 500		
68 (686)	* 500			
100 (107)				

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

● Marking

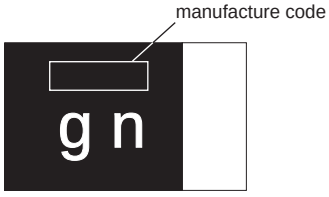
The indications listed below should be given on the surface of a capacitor.

(1) Polarity : The polarity should be shown by ☐ bar. (on the anode side)
(2) Rated DC voltage : Due to the small size of P case, a voltage code is used as shown below.
(3) Visual typical example (1) voltage code (2) capacitance code

Voltage Code	Rated DC Voltage (V)
e	2.5
g	4
j	6.3
A	10

Capacitance Code	Nominal Capacitance (μF)
N	3.3
S	4.7
W	6.8
a	10
e	15
j	22
n	33
s	47
w	68

[Pcase] note 1) g (1) n (2)



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

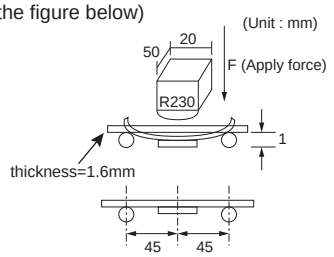
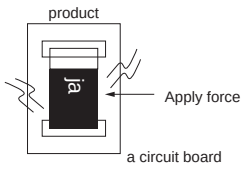
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● Characteristics

Item		Performance	Test conditions (based on JIS C 5101–1 and JIS C 5101–3)
Operating Temperature		–55°C to +105°C	Voltage reduction when temperature exceeds +85°C
Maximum operating temperature with no voltage derating		+85°C	
Rated voltage (VDC)		2.5 | 4 | 6.3 | 10	at 85°C
Category voltage (VDC)		2 | 3.2 | 5 | 8	at 105°C
Surge voltage (VDC)		3.2 | 5.0 | 8 | 13	at 85°C
DC Leakage current		Shall be satisfied the voltage 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 +1.5 to 2V.DC Measuring circuit : DC Equivalent series circuit
Tangent of loss angle (Df, tan δ)		Shall be satisfied the voltage 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 +1.5 to 2V.DC Measuring circuit : DC Equivalent series circuit
ESR		Shall be satisfied the voltage 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.	As per 4.14 JIS C 5101-1 As per 4.6 JIS C 5101-3 Dip in the solder bath Solder temp : 240±5°C Duration : 10±0.5s Repetition : 1 After the specimens, leave it at room temperature for over 24h and then measure the sample.
	L.C.	Less than 300% of initial limit	
	ΔC / C	Within ±20% of initial value	
	Df (tan δ)	Less than 300% of initial limit	
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.
	L.C.	Less than 1000% of initial limit	
	ΔC / C	Within ±20% of initial value	
	Df (tan δ)	Less than 300% 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 40±2°C and 90 to 95% RH, respectiveiy, for 500±12h leave it at room temperature for 24h and then measure the sample.
	L.C.	Less than 300% of initial limit	
	ΔC / C	Within +30/–20% of initial value	
	Df (tan δ)	Less than 300% of initial limit	

	Temp.	Time
1	–55±3°C	30±3min.
2	Room temp.	3min. or less
3	105±2°C	30±3min.
4	Room temp.	3min. or less

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Item		Performance	Test conditions (based on JIS C 5101−1 and JIS C 5101− 3)
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/−20% of initial value	
	Df (tan δ)	Shall be satisfied the voltage on " Standard list "	
	L.C.	−	
	Temp.	+105°C	
	ΔC / C	Within +50/0% of initial value	
	Df (tan δ)	Shall be satisfied the voltage on " Standard list "	
	L.C.	Less than 1,000% of initial value	
Surge voltage	Appearance	There should be no significant abnormality.	As per 4.26JIS C 5101-1 As per 4.14JIS C 5101-3 Apply the specified surge voltage 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 value	
	ΔC / C	Within ±20% of initial value	
	Df (tan δ)	Less than 200% of initial limit	
Loading at High temperature	Appearance	There should be no significant abnormality.	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 24h and measure the value.
	L.C.	Less than 400% of initial limit	
	ΔC / C	Within ±20% of initial value	
	Df (tan δ)	Less than 300% 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) 
	Appearance	There should be no significant abnormality.	
Adhesiveness		The terminal should not come off.	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. 
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	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.
Solderability		3/4 or more surface area of the solder coated terminal dipped in the soldering bath should be covered with the new solder.	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%
Vibration	Capacitance	Measure value should not fluctuate during the measurement.	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.
	Appearance	There should be no significant abnormality.	

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● Standard products list, TCTO series P cace

Part No.	Rated voltage 85°C (V)	Category voltage 125°C (V)	Surge voltage 85°C (V)	Cap. 120Hz (μF)	Tolerance (%)	Leakage current 25°C 1WV.5min (μA)	Df 120Hz (%)			ESR 100kHz (mΩ)
							–55°C	25°C 85°C	105°C	
* TCTO P 0E 476 ☐	2.5	2	3.2	47	± 20	11.8	15	15	20	500
* TCTO P 0E 686 ☐	2.5	2	3.2	68	± 20	17.0	15	15	20	500
* TCTO P 0G 336 ☐	4	3.2	5	33	± 20	13.2	15	15	20	500
* TCTO P 0G 476 ☐	4	3.2	5	47	± 20	18.8	15	15	20	500
* TCTO P 0J 226 ☐	6.3	5	8	22	± 20	13.9	15	15	20	500
* TCTO P 0J 336 ☐	6.3	5	8	33	± 20	20.8	15	15	20	500
* TCTO P 1A 335 ☐	10	8	13	3.3	± 20	3.3	10	10	15	500
* TCTO P 1A 475 ☐	10	8	13	4.7	± 20	4.7	10	10	15	500
* TCTO P 1A 685 ☐	10	8	13	6.8	± 20	6.8	10	10	15	500
TCTO P 1A 106 ☐	10	8	13	10	± 20	10.0	15	15	20	500
* TCTO P 1A 156 ☐	10	8	13	15	± 20	15.0	15	15	20	500

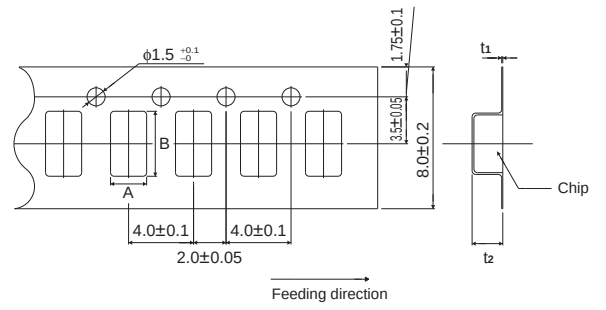
☐=Tolerance(M : ± 20%)
＊=Under development

● Packaging specifications

(Unit : mm)

Case code	A±0.1	B±0.1	t1±0.05	t2±0.1
P	1.55	2.3	0.25	1.32

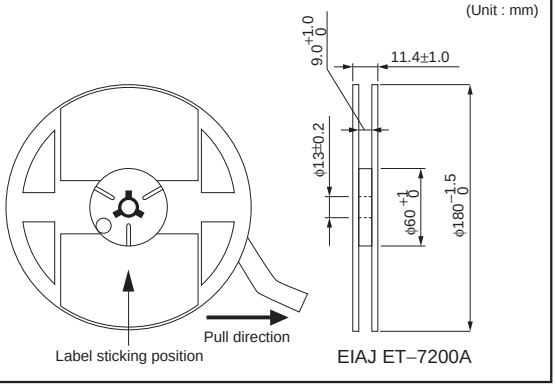
Taping [P case]



● Packaging style

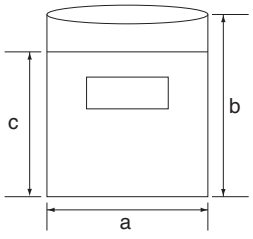
Case code	Packaging	Packaging style		Symbol	Basic ordering units
P case	Taping	plastic taping	ϕ180mm Reel	8R	3,000pcs

Reel [P case]



● Damp proof package

① One reel is packed in aluminum bag.
The size of aluminum bag is 240(a) x 250(b)mm.
The size up to 230(c)mm is to zipper.
② A desiccant is packed with a reel.
③ The aluminum bag is heat-sealed.
④ The label of the same as the label on the reel is placed on the aluminum bag.



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