

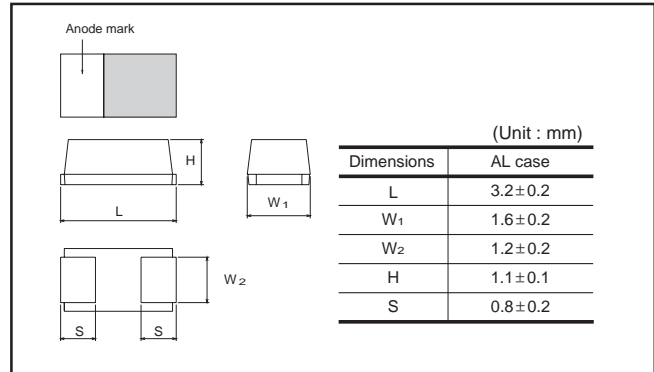
Conductive polymer chip tantalum capacitors (Bottom surface electrode type)

TCTO Series AL Case

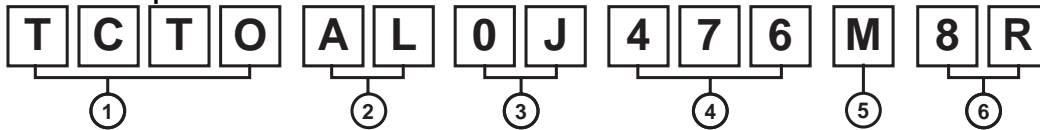
●Features (AL)

- 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)



●Part No. Explanation



① Series name
TCTO

② Case style
AL

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.

● **Rated table**

(μF)	Rated voltage (V)			
	2.5 0E	4 0G	6.3 0J	10 1A
1.0 (105)				
2.2 (225)				
3.3 (335)				AL*
4.7 (475)				AL*
6.8 (685)				AL*
10 (106)				AL*
15 (156)				
22 (226)				AL
33 (336)				AL
47 (476)			AL	
68 (686)		AL		
100 (107)	AL			
150 (157)				
220 (227)				

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

● **Marking**

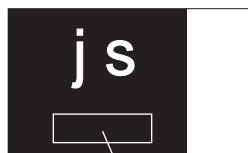
The indications listed below should be given on the surface of a capacitor.

- (1) Polarity : The polarity should be shown by □ bar. (on the anode side)
- (2) Rated DC voltage : Due to the small size of AL 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)
A	1.0
E	1.5
J	2.2
N	3.3
S	4.7
W	6.8
a	10
e	15
j	22
n	33
s	47
w	68
ā	100

[AL case] note 1) $\frac{j}{(1)} \frac{s}{(2)}$



manufacture code

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 +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)		1.6 2.5 4 6.3	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																
		<table border="1"> <thead> <tr> <th></th> <th>Temp.</th> <th>Time</th> </tr> </thead> <tbody> <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>105±2°C</td> <td>30±3min.</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>3min. or less</td> </tr> </tbody> </table>			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
	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																
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, respectively, 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																

Item	Performance	Test conditions (based on JIS C 5101-1 and JIS C 5101-3)
Temperature Stability	Temp.	-55°C
	$\Delta C / C$	Within 0/-20% of initial value
	Df (tan δ)	Shall be satisfied the voltage on " Standard list "
	L.C.	-
	Temp.	+105°C
	$\Delta C / C$	Within +50/0% of initial value
	Df (tan δ)	Shall be satisfied the voltage on " Standard list "
Surge voltage	Appearance	There should be no significant abnormality.
	L.C.	Less than 200% of initial value
	$\Delta C / C$	Within $\pm 20\%$ of initial value
	Df (tan δ)	Less than 200% of initial limit
Loading at High temperature	Appearance	There should be no significant abnormality.
	L.C.	Less than 400% of initial limit
	$\Delta C / C$	Within $\pm 20\%$ of initial value
	Df (tan δ)	Less than 300% of initial limit
Terminal strength	Capacitance	The measured value should be stable.
	Appearance	There should be no significant abnormality.

As per 4.29 JIS C 5101-1
As per 4.13 JIS C 5101-3

As per 4.26 JIS C 5101-1
As per 4.14 JIS C 5101-3
Apply the specified surge voltage every 5 ± 0.5 min. for 30 ± 5 s. each time in the atmospheric condition of $85 \pm 2^\circ\text{C}$. Repeat this procedure 1,000 times.
After the specimens, leave it at room temperature for over 24h and then measure the sample.

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 $85 \pm 2^\circ\text{C}$, leave the sample at room temperature / humidity for 24h and measure the value.

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)

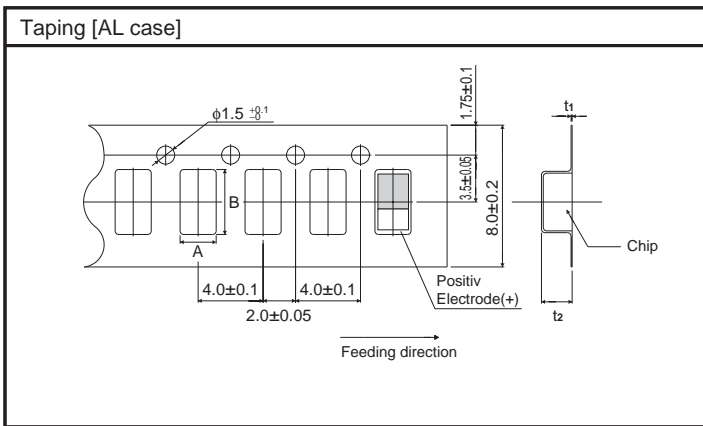
Item	Performance	Test conditions (JIS C 5101-1 and JIS C 5101-3)
Adhesiveness	The terminal should not come off.	As per 4.34 JIS C 5101-1 As per 4.8 JIS C 5101-3 Apply force of 5N in the two directions shown in the figure below for 10 ± 1 s after mounting the terminal on a circuit board.
Dimensions	Refer 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 ± 5 s, 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 ± 2.5 mm / s Pre-treatment (accelerated aging): Leave the sample on the boiling distilled water for 1 h. Solder temp. : $245 \pm 5^\circ\text{C}$ Duration : 3 ± 0.5 s Solder : M705 Flux : Rosin 25% IPA 75%
Vibration	Capacitance	Measure value should not fluctuate during the measurement.
	Appearance	There should be no significant abnormality.

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.

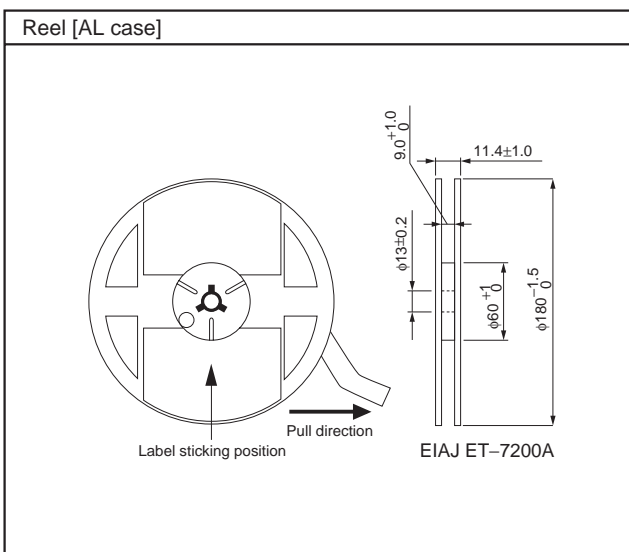
Part No.	Rated voltage 85°C (V)	Category voltage 125°C (V)	Surge voltage 85°C (V)	Cap. 120Hz (μF)	Tolerance (%)	Leakage current 25°C 1WV.5min (μA)	Df 120Hz (%)			ESR 100kHz (mΩ)
							-55°C	25°C 85°C	105°C	
TCTO AL 0E 107 □	2.5	2	3.2	100	± 20	25.0	10	10	15	200
TCTO AL 0G 686 □	4	3.2	5.2	68	± 20	27.2	10	10	15	200
TCTO AL 0J 476 □	6.3	5	8	47	± 20	29.6	10	10	15	200
* TCTO AL 1A 335 □	10	8	13	3.3	± 20	3.3	6	6	9	300
* TCTO AL 1A 475 □	10	8	13	4.7	± 20	4.7	6	6	9	300
* TCTO AL 1A 685 □	10	8	13	6.8	± 20	6.8	6	6	9	300
* TCTO AL 1A 106 □	10	8	13	10	± 20	10.0	6	6	9	200
TCTO AL 1A 226 □	10	8	13	22	± 20	22.0	6	6	9	200
TCTO AL 1A 336 □	10	8	13	33	± 20	33.0	10	10	15	200

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

Case code	A±0.1	B±0.1	t1±0.05	t2±0.1
AL	1.9	3.5	0.25	1.3



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



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