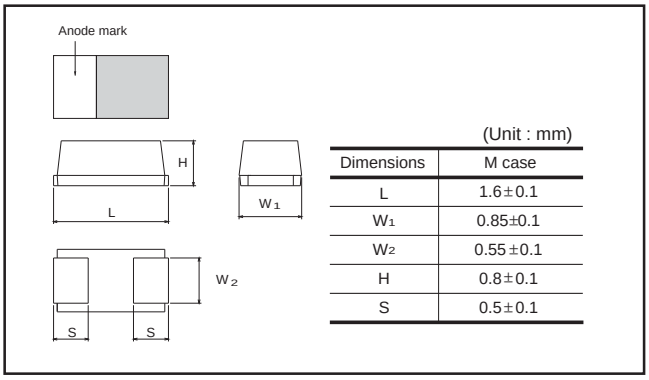
Conductive polymer chip capacitors (Bottom surface electrode type : Large capacitance)

TCTO Series M Case

●Features (M)

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	M case
L	1.6±0.1
W1	0.85±0.1
W2	0.55±0.1
H	0.8±0.1
S	0.5±0.1

●Part No. Explanation

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

① Series name
TCTO

② Case style
M

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

(ESR : mΩ)

(μF)	Rated voltage (V.DC)			
	2.5 0E	4 0G	6.3 0J	10 1A
1.0 (105)				
1.5 (155)				
2.2 (225)				800
3.3 (335)				800
4.7 (475)				* 800
6.8 (685)			* 800	
10 (106)		* 800	* 800	
15 (156)	* 800	* 800		
22 (226)	* 800			
33 (336)				
47 (476)				

* Under development

● Marking

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

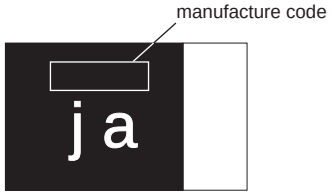
(1) Polarity : The polarity should be shown by ☐ bar. (on the anode side)
(2) Rated DC voltage : Due to the small size of M case, a voltage code is used as shown below.
(3) Visual typical example (1) voltage code (2) capacitance code

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

Capacitance Code	Nominal Capacitance (μF)
J	2.2
N	3.3
S	4.7
W	6.8
a	10
j	22

[Mcase]

note 1) $\frac{j}{(1)}\ \frac{a}{(2)}$

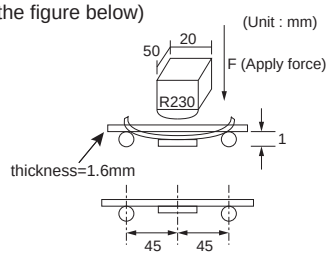
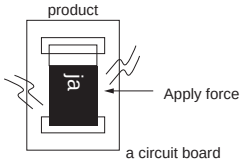


note 2) voltage code and capacitance code are variable with parts number

● Characteristics

Item		Performance	Test conditions (based on JIS C 5101–1 and JIS C 5101–3)
Operating Temperature		–55°C to +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

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+72/0 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.	

● Standard products list, TCTO series M 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 M 0E 156 ☐	2.5	2	3.2	15	±20	3.8	8	8	12	800
* TCTO M 0E 226 ☐	2.5	2	3.2	22	±20	5.5	8	8	12	800
* TCTO M 0G 106 ☐	4	3.2	5	10	±20	4.0	8	8	12	800
* TCTO M 0G 156 ☐	4	3.2	5	15	±20	6.0	8	8	12	800
* TCTO M 0J 685 ☐	6.3	5	8	6.8	±20	4.3	6	6	9	800
* TCTO M 0J 106 ☐	6.3	5	8	10	±20	6.3	8	8	12	800
TCTO M 1A 225 ☐	10	8	13	2.2	±20	2.2	6	6	9	800
TCTO M 1A 335 ☐	10	8	13	3.3	±20	3.3	6	6	9	800
* TCTO M 1A 475 ☐	10	8	13	4.7	±20	4.7	6	6	9	800

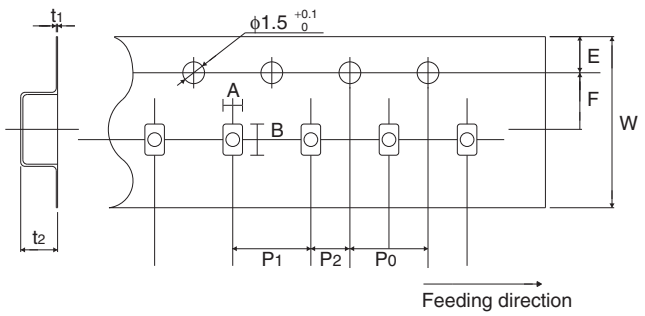
☐=Tolerance(M : ± 20%)
＊=Under development

● Packaging specifications

(Unit : mm)

Case code	A±0.1	B±0.1	W±0.2	E±0.1	F±0.05	P1±0.1	P2±0.05	P0±0.1	t1±0.05	t2±0.1
M	1.0	1.85	8.0	1.75	3.5	4.0	2.0	4.0	0.20	1.0

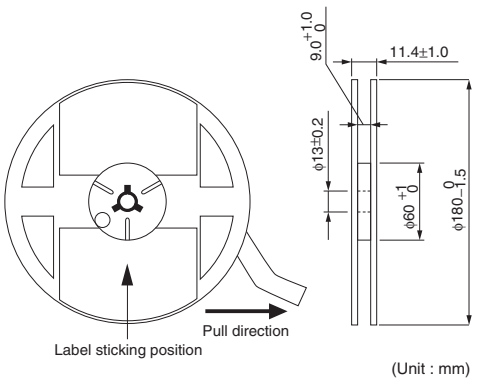
Taping [M case]



● Packaging style

Case code	Packaging	Packaging style		Symbol	Basic ordering units
M case	Taping	plastic taping	φ180mm Reel	8R	4,000pcs

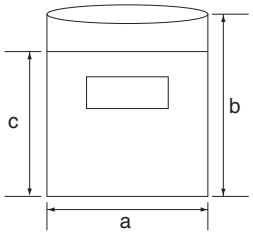
Reel [M case]



(Unit : mm)
EIAJ ET–7200A

● 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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