

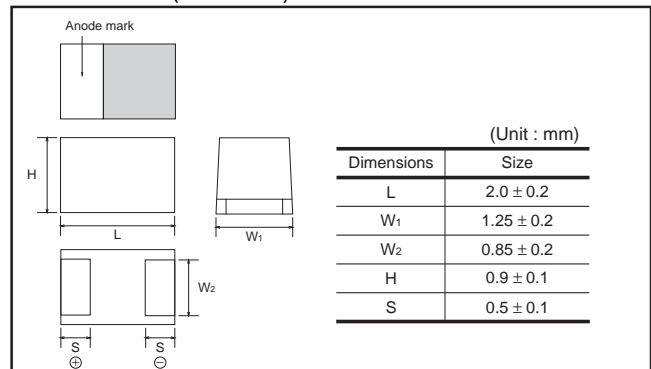
Conductive polymer chip capacitors (New Bottom surface electrode type : Extra Large capacitance)

TCSO Series PL Case

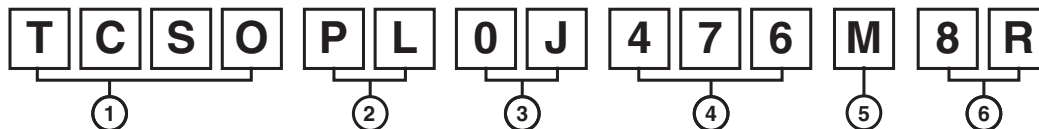
●Features (PL)

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

●Dimensions (Unit : mm)



●Part No. Explanation



① Series name
TCSO

② Case style
PL

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	4	6.3	10
10 (106)				* 200
15 (156)				* 200
22 (226)			* 200	
33 (336)		* 200	* 200	
47 (476)	* 200	* 200	200	
68 (686)	* 200			

* Under development

● **Marking**

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

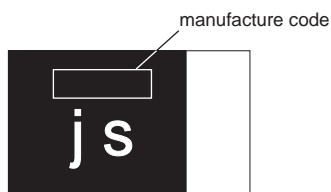
- (1) Polarity : The polarity should be shown by □ bar. (on the anode side)
- (2) Rated DC voltage : A voltage code is used as shown below.
- (3) Visual typical example (1) voltage code (2) capacitance code

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

Capacitance Code	Nominal Capacitance (μF)
a	10
e	15
j	22
n	33
s	47
w	68

[PLcase]

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



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 (V.DC)		2.5 4 6.3 10	at 85°C															
Category voltage (V.DC)		2 3.2 5 8	at 105°C															
Surge voltage (V.DC)		3.2 5 8 13	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 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 +1.5V.DC Measuring circuit : DC equivalent series circuit															
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.	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. <table border="1" style="margin-left: 20px;"> <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> 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	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																
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, respectively, for 500±12h leave it at room temperature for over 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	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 value on " Standard list "	
	L.C.	-	
	Temp.	+105°C	
	ΔC / C	Within +50/0% of initial value	
	Df (tan δ)	Shall be satisfied the value on " Standard list "	
	L.C.	Less than 1,000% of initial value	
Surge voltage	Appearance	There should be no significant abnormality. The indications should be clear.	As per 4.26 JIS C 5101-1 As per 4.14 JIS C 5101-3 Apply the specified surge voltage via the serial resistance of 1kΩ ever 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 ±20% 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+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 over 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 maintains 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, TCSO series PL case

Part No.	Rated voltage 85°C (V)	Category voltage 105°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	105°C	
* TCSO PL 0E 476 M8R	2.5	2	3.2	47	± 20	11.8	15	15	20	500
* TCSO PL 0E 686 M8R	2.5	2	3.2	68	± 20	17.0	15	15	20	500
* TCSO PL 0G 336 M8R	4	3.2	5	33	± 20	13.2	15	15	20	500
* TCSO PL 0G 476 M8R	4	3.2	5	47	± 20	18.8	15	15	20	500
* TCSO PL 0J 226 M8R	6.3	5	8	22	± 20	13.9	15	15	20	500
* TCSO PL 0J 336 M8R	6.3	5	8	33	± 20	20.8	15	15	20	500
TCSO PL 0J 476 M8R	6.3	5	8	47	± 20	29.7	15	15	20	500
* TCSO PL 1A 106 M8R	10	8	13	10	± 20	10.0	15	15	20	500
* TCSO PL 1A 156 M8R	10	8	13	15	± 20	15.0	15	15	20	500

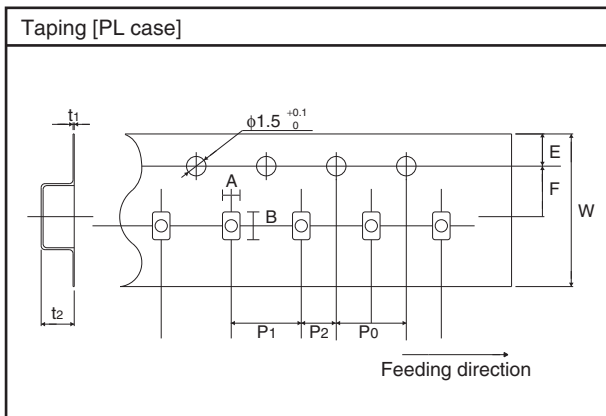
* = Under development

Please contact us for specification of low ESR products.

● Packaging specifications

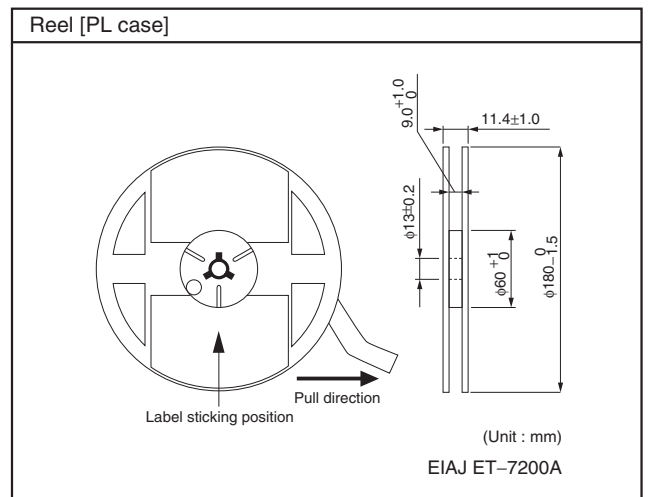
(Unit : mm)

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±0.05
PL	1.6	2.4	8.0	1.75	3.5	4.0	2.0	4.0	0.25	1.05



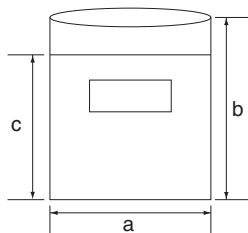
● Packaging style

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



● 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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