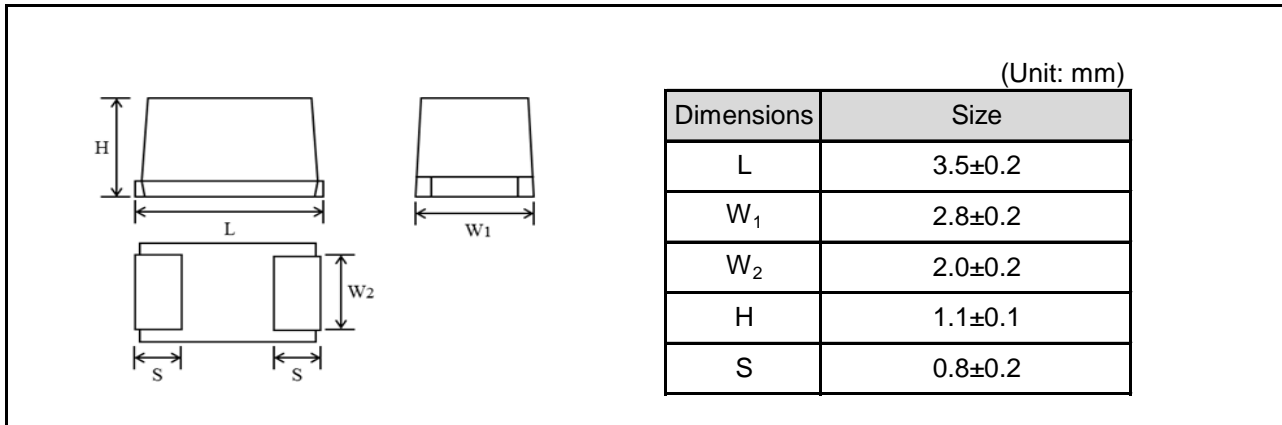


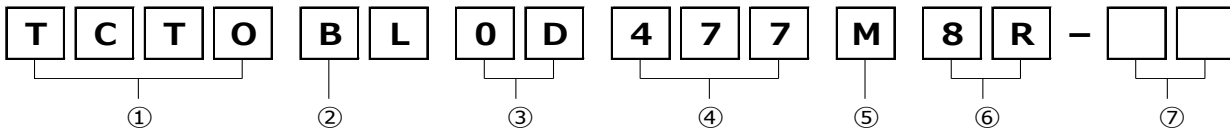
#### ● Features

- 1) Conductive polymer used at the cathode for ultra-low ESR.
- 2) Bottom electrode configuration results in the largest capacitance.
- 3) Compact, low profile, high capacitance contribute to smaller, thinner sets with greater functionality.
- 4) Conductive polymer has a self-healing function that prevents failure, resulting in safe, high reliability operation.

#### ● Dimensions



#### ● Part No. Explanation



① Series name  
TCTO

② Case style  
BL : 3528(12)size

③ Rated voltage

CODE	Rated voltage(V)
0D	2
0E	2.5
0G	4
0J	6.3
1A	10
1C	16
1D	20
1E	25
1V	35

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

⑦ Discrimination code

## ● Rated table

Capacitance ( $\mu\text{F}$ )	Rated voltage (V.DC)									ESR(m $\Omega$ )
	2	2.5	4	6.3	10	16	20	25	35	
4.7 (475)										
6.8 (685)										150
10 (106)								☆100	☆200	
15 (156)								100		
22 (226)							☆100	☆100		
33 (336)						70				
47 (476)					100	70				
68 (686)										
100 (107)				☆25/ ☆35/45						
150 (157)				25/35						
220 (227)		☆25/☆35		☆25/☆35						
330 (337)		20/ ☆25/☆35	☆25/ ☆35/☆45							
470 (477)	☆15									

☆ 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: A capacitance code is shown as below table.

Voltage Code	Rated DC Voltage (V)
d	2
e	2.5
g	4
j	6.3
k	8
A	10
C	16
D	20
E	25
V	35

Capacitance Code	Nominal Capacitance ( $\mu\text{F}$ )	Capacitance Code	Nominal Capacitance ( $\mu\text{F}$ )
<u>E</u>	0.15	e	15
<u>N</u>	0.33	j	22
<u>S</u>	0.47	n	33
A	1.0	s	47
E	1.5	<u>w</u>	68
J	2.2	<u>a</u>	100
N	3.3	<u>e</u>	150
S	4.7	<u>j</u>	220
W	6.8	<u>n</u>	330
a	10	<u>s</u>	470

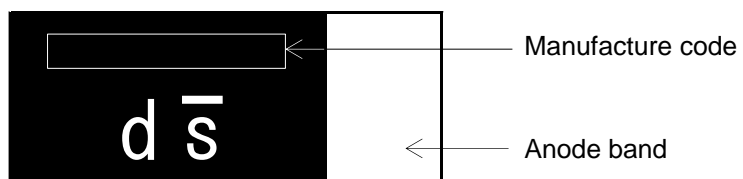
Visual typical example

voltage code and capacitance code are variable with parts number.

[TCTO series BL case]

EX.)  $\frac{d}{(1)}$   $\frac{\bar{s}}{(2)}$

(1) voltage code  
(2) capacitance code



## ● Characteristics

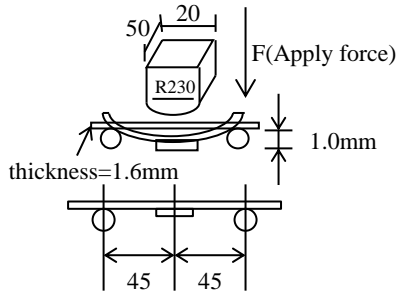
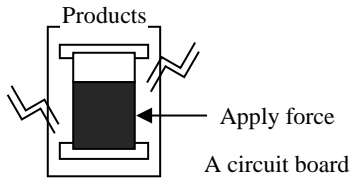
Item		Performance	Test conditions (based on JIS C 5101-1 and JIS C 5101-3)
Operating Temperature		-55°C~+105°C	
Maximum operating temperature with no voltage derating		+105°C	
Rated voltage (V.DC)		Refer to " Standard list ".	at 105°C
Category voltage (V.DC)		Refer to " Standard list ".	at 105°C
Surge voltage (V.DC)		Refer to " Standard list ".	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. $\pm 20\%$	As per 4.7 JIS C 5101-1 As per 4.5.2 JIS C 5101-3 Measuring frequency : $120 \pm 12\text{Hz}$ Measuring voltage : $0.5V_{\text{rms}} + 1.5V_{\text{DC}}$ Measuring circuit : DC Equivalent series circuit
Tangent of loss angle (Df,tanδ)		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 : $120 \pm 12\text{Hz}$ Measuring voltage : $0.5V_{\text{rms}} + 1.5V_{\text{DC}}$ 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 : $100 \pm 10\text{kHz}$ Measuring voltage : $0.5V_{\text{rms}}$ 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 : $240 \pm 5^\circ\text{C}$ Duration : $10 \pm 0.5\text{s}$ Repetition : 1 After the specimens, leave it at room temperature for over 24h and then measure the sample.
	L.C.	Less than 150% of initial limit.	
	$\Delta C/C$	Within $\pm 20\%$ of initial value.	
	DF (tanδ)	Less than 150% 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 500% of initial limit.	
	$\Delta C/C$	Within $\pm 20\%$ of initial value.	
	DF (tanδ)	Less than 150% of initial limit.	

	Temp.	Time
1	$-55 \pm 3^\circ\text{C}$	$30 \pm 3\text{min}$
2	Room Temp.	3min or less
3	$105 \pm 2^\circ\text{C}$	$30 \pm 3\text{min}$
4	Room Temp.	3min or less

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)
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 90~95%(Relative Humidity) , respectively ,for 500+12/0h leave it at room temperature for over 24h and then measure the sample.
	L.C.	Less than 150% of initial limit.	
	ΔC/C	Within +30/-20% of initial value.	
	DF (tanδ)	Less than 150% 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/-20% of initial value.	
	DF (tanδ)	Shall be satisfied the value on " Standard list "	
	L.C.	—	
	Temp. : +105°C		
	ΔC/C	Within +80/0% of initial value.	
	DF (tanδ)	Shall be satisfied the value on " Standard list "	
	L.C.	Less than 1000% 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 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 150% of initial limit.	
	ΔC/C	Within ±20% of initial value.	
	DF (tanδ)	Less than 150% 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 or category voltage for 1000+72/0hwithout discontinuation via the serial resistance of 3Ωor less at a temperature of 105±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 ±20% of initial value.	
	DF (tanδ)	Less than 150% of initial limit.	

Item		Performance	Test conditions (based on JIS C 5101-1 and JIS C 5101-3)
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
	Appearance	There should be no significant abnormality.	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) 
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 2N 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 1h. 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.
	Appearance	There should be no significant abnormality.	Amplitude : 1.5mm Time : 2h each in X and Y directions Mounting : The terminal is soldered on a print circuit board.

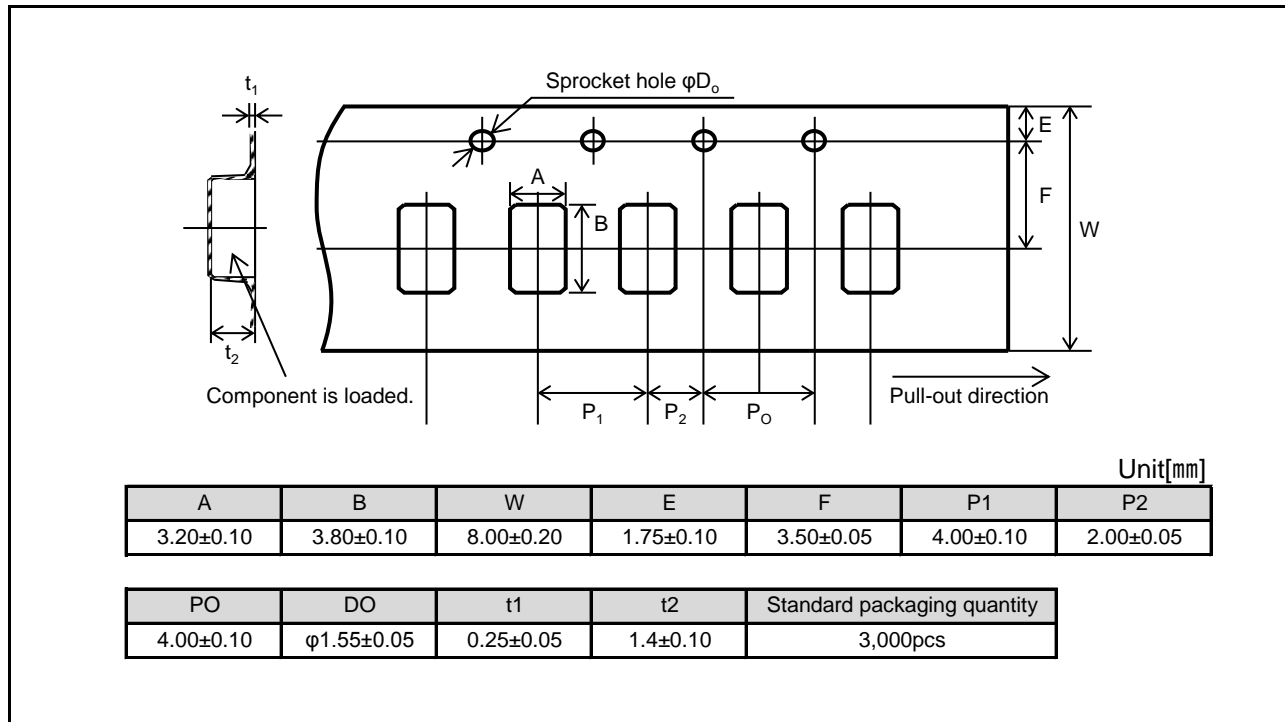
## ● Standard products list

Part No.	Rated voltage 105°C	Category voltage 105°C	Surge voltage 85°C	Cap. 120Hz	Tolerance	Leakage current 25°C 1WV 5min	tanδ 120Hz			ESR 100kHz	Max allowable ripple current ≤45°C 100kHz (mA <sub>rms</sub> )
							-55°C	25°C	105°C		
	(V)	(V)	(V)	(μF)	(%)	(μA)	(%)	(%)	(%)	(mΩ)	(mA <sub>rms</sub> )
* TCTOBL0D477M8R-ZE1	2	2	2.6	470	±20	94.0	30	15	20	15	2,500
* TCTOBL0E227M8R-ZK1	2.5	2.5	3.2	220	±20	55.0	8	8	12	25	2,000
* TCTOBL0E227M8R-ZN1	2.5	2.5	3.2	220	±20	55.0	8	8	12	35	1,700
TCTOBL0E337M8R-2A1	2.5	2.5	3.2	330	±20	82.5	30	15	20	20	2,200
* TCTOBL0E337M8R-ZK1	2.5	2.5	3.2	330	±20	82.5	30	15	20	25	2,000
* TCTOBL0E337M8R-ZN1	2.5	2.5	3.2	330	±20	82.5	30	15	20	35	1,700
* TCTOBL0G337M8R-ZK1	4	4	5	330	±20	132.0	30	15	20	25	2,000
* TCTOBL0G337M8R-ZN1	4	4	5	330	±20	132.0	30	15	20	35	1,700
* TCTOBL0G337M8R-ZS1	4	4	5	330	±20	132.0	30	15	20	45	1,500
* TCTOBL0J107M8R-ZK1	6.3	6.3	8	100	±20	63.0	8	8	12	25	2,000
* TCTOBL0J107M8R-ZN1	6.3	6.3	8	100	±20	63.0	8	8	12	35	1,700
TCTOBL0J107M8R-ZS1	6.3	6.3	8	100	±20	63.0	8	8	12	45	1,500
TCTOBL0J157M8R-ZK1	6.3	6.3	8	150	±20	94.5	30	15	20	25	2,000
TCTOBL0J157M8R-ZN1	6.3	6.3	8	150	±20	94.5	30	15	20	35	1,700
* TCTOBL0J227M8R-ZK1	6.3	6.3	8	220	±20	139.0	30	15	20	25	2,000
* TCTOBL0J227M8R-ZN1	6.3	6.3	8	220	±20	139.0	30	15	20	35	1,700
TCTOBL1A476M8R-ZB1	10	10	13	47	±20	47.0	8	8	12	100	1,000
TCTOBL1C336M8R-ZW1	16	16	20	33	±20	52.8	10	10	15	70	1,200
TCTOBL1C476M8R-ZW1	16	16	20	47	±20	75.2	10	10	15	70	1,200
* TCTOBL1D226M8R-ZB1	20	20	23	22	±20	88.0	10	10	15	100	1,000
* TCTOBL1E106M8R-ZB1	25	25	29	10	±20	50.0	10	10	15	100	1,000
TCTOBL1E156M8R-ZB1	25	25	29	15	±20	75.0	10	10	20	100	1,000
* TCTOBL1E226M8R-ZB1	25	20	29	22	±20	110.0	10	10	20	100	1,000
TCTOBL1V685M8R-ZF1	35	35	40	6.8	±20	47.6	10	10	15	150	800
* TCTOBL1V106M8R-ZD1	35	35	40	10	±20	70.0	10	10	15	200	700

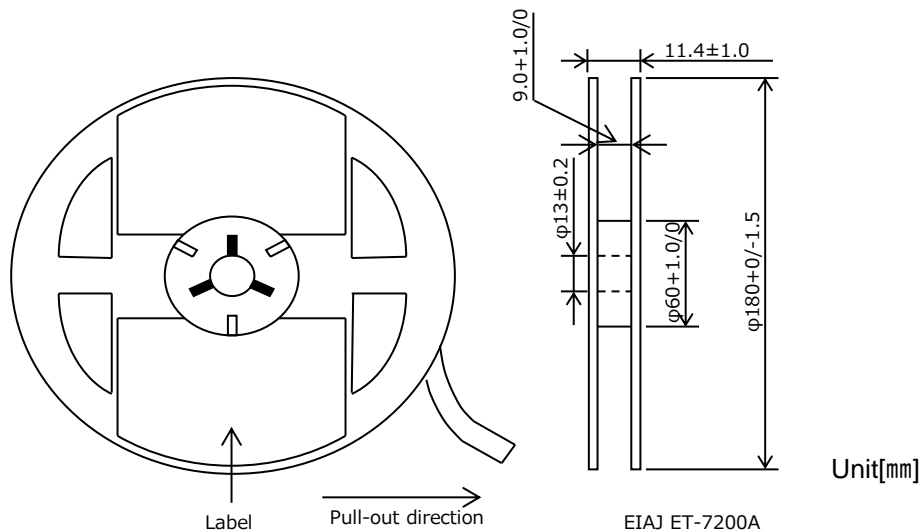
\* This specification has possibility of charge, due to underdevelopment product.

Please ask for latest specification to our sales.

## ● Packaging specifications



## ● Reel dimensions



## ● Damp proof package

① One reel is packed in aluminum bag.

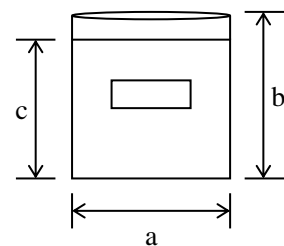
The size of aluminum bag is 240(a) x 250(b)mm.

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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