Conductive polymer chip capacitors (Standard)

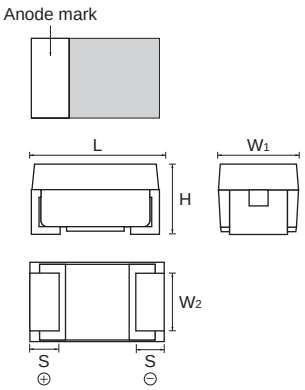
TCO Series B Case

Datasheet

●Features

1) Conductive polymer used at the cathode for ultra-low ESR.
2) Conductive polymer has a self-healing function that prevents failure, resulting in safe, high reliability operation.
3) Screening by thermal shock.

●Dimensions



(Unit : mm)

Dimensions	Size
L	3.5 ± 0.2
W_1	2.8 ± 0.2
W_2	1.9 ± 0.2
H	1.9 ± 0.2
S	0.8 ± 0.3

●Part No. Explanation

T	C	O	B	0	J	4	7	6	M	8	R	E	
①			②	③		④			⑤	⑥		⑦	

① Series name

TCO

② Case style

B : 3528-21 (1411) size

③ Rated voltage

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

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

ESR (mΩ)	15	35	45	70	100	150
CODE	EE	EN	ES	EW	EB	EC

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

●Rated table

(ESR : mΩ)

Capacitance (μF)	Rated voltage (V.DC)						
	2.5	4	6.3	10	16	20	25
4.7 (475)							☆150
6.8 (685)						☆150	☆100
10 (106)					☆150		
15 (156)							
22 (226)							
33 (336)			150	70/150			
47 (476)			150	70/150			
68 (686)			150				
100 (107)			☆15 35/45/150				
150 (157)		150	☆15 35/45/70/150				
220 (227)	35/45/150	☆15/150	35/70/150				
330 (337)	35/45/150						

☆ 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)
e	2.5
g	4
j	6.3
A	10
C	16
D	20
E	25

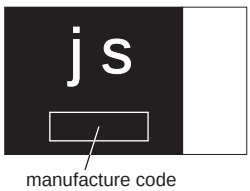
Capacitance Code	Nominal Capacitance (μF)
S	4.7
W	6.8
a	10
e	15
j	22
n	33
s	47
w	68
$\overline{a}$	100
$\overline{e}$	150
$\overline{j}$	220
$\overline{n}$	330

Visual typical example
voltage code and capacitance code are variable with parts number.

[B case]

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

(1) voltage code (2) capacitance code

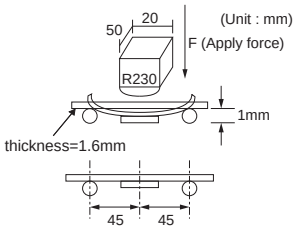
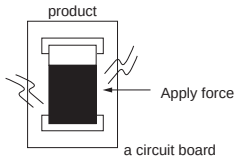


manufacture code

●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 / 16 / 20 / 25	at 85°C
Category voltage (V.DC)		2 / 3.2 / 5 / 8 / 12.8 / 16 / 22	at 105°C
Surge voltage (V.DC)		3.2 / 5 / 8 / 13 / 20 / 26 / 32	at 85°C
DC Leakage current		3μA or 0.1CV whichever is greater Shown in " Standard list "	Rated voltage for 5min
Capacitance tolerance		±20% Shall be satisfied allowance range.	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 "	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 "	Measuring frequency : 100±10kHz Measuring voltage : 0.5Vrms or less
Resistance to Soldering heat	Appearance	There should be no significant abnormality. The indications should be clear.	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 150% of initial limit	
	⊿C / C	Within±20% of initial value	
	tan δ	Less than 150% of initial limit	
Temperature cycle	Appearance	There should be no significant abnormality.	Repetition : 5 cycles (1 cycle : steps 1 to 4) without discontinuation. After the specimens, leave it at room temperature for over 24h and then measure the sample.
	L.C	Less than 500% of initial limit	
	⊿C / C	Within 20% of intial value	
	Df (tan δ)	Less than 150% of initial limit	
Moisture resistance	Appearance	There should be no significant abnormality. The indications should be	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 over 24h and then measure the sample.
	L.C	Less than 150% of initial limit	
	⊿C / C	+30% / –20%	
	Df (tan δ)	Less than 150% 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

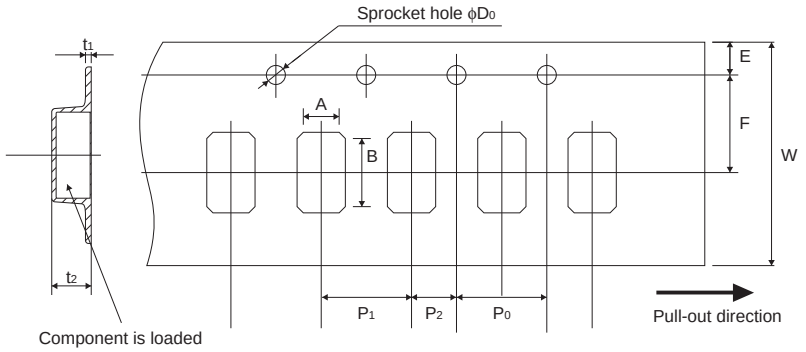
Item		Performance	Test conditions (based on JIS C 5101–1 and JIS C 5101–3)
Temperature Stebility	Temp.	–55°C	
	⊿C / C	Within 0/–20% of initial value	
	Df (tan δ)	Shall be satisfied the voltage on " Standard list "	
	L.C	–	
	Temp.	+105°C	
	⊿C / C	Within +50/0% of initial value	
	Df (tan δ)	Shall be satisfied the voltage on " Standard list "	
	L.C	Less than 1CV	
Surge voltage	Appearance	There should be no significant abnormality.	Apply the specified serge voltage every 5±0.5 min. for 30±5 s. each time in the atmospheric condition of 85±2°C. Repeat this rocedure 1,000 times. After the specimens, leave it at room temperature for over 24h and then measure the sample.
	L.C	Less than initial limit	
	⊿C / C	Within±20% of initial value	
	Df (tan δ)	Less than initial limit	
Loading at High temperature	Appearance	There should be nonsignificant abnormality.	After applying the rated voltage for 1000^{+72} 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 200% of initial limit	
	⊿C / C	Within±20% of initial value	
	Df (tan δ)	150% of initial limit less than	
Terminal strength	Capacitance	The measured value should be stable.	A force is applied to the terminal until it bends to 1mm and by a perscribed tool maintain the condition for5s.(See the figure below) 
	Appearance	There should nonsignificant abnormality.	
Adhesiveness		The terminal should not come off.	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 JISB 7507 Class 2 or higher grade.
Resistance to solvents		The indication should be clear	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.	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 : Rosin25% IPA75%
Vibration	Capacitance	Measure value should not fluctuate during the measurement.	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 no significant abnormality.	

●Standard products list

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	
TCO B 0E 227 M8R-EN	2.5	2	3.2	220	±20	55	8	8	12	35
TCO B 0E 227 M8R-ES	2.5	2	3.2	220	±20	55	8	8	12	45
TCO B 0E 227 M8R-EC	2.5	2	3.2	220	±20	55	8	8	12	150
TCO B 0E 337 M8R-EN	2.5	2	3.2	330	±20	82.5	30	15	20	35
TCO B 0E 337 M8R-ES	2.5	2	3.2	330	±20	82.5	30	15	20	45
TCO B 0E 337 M8R-EC	2.5	2	3.2	330	±20	82.5	30	15	20	150
TCO B 0G 157 M8R	4	3.2	5	150	±20	60	8	8	12	150
＊TCO B 0G 227 M8R-EE	4	3.2	5	220	±20	88	30	15	20	15
＊TCO B 0G 227 M8R-EC	4	3.2	5	220	±20	88	30	15	20	150
TCO B 0J 336 M8R	6.3	5	8	33	±20	21	8	8	12	150
TCO B 0J 476 M8R	6.3	5	8	47	±20	30	8	8	12	150
TCO B 0J 686 M8R	6.3	5	8	68	±20	42.9	8	8	12	150
＊TCO B 0J 107 M8R-EE	6.3	5	8	100	±20	63	8	8	12	15
TCO B 0J 107 M8R-EN	6.3	5	8	100	±20	63	8	8	12	35
TCO B 0J 107 M8R-ES	6.3	5	8	100	±20	63	8	8	12	45
TCO B 0J 107 M8R-EC	6.3	5	8	100	±20	63	8	8	12	150
＊TCO B 0J 157 M8R-EE	6.3	5	8	150	±20	94.5	30	15	20	15
TCO B 0J 157 M8R-EN	6.3	5	8	150	±20	94.5	30	15	20	35
TCO B 0J 157 M8R-ES	6.3	5	8	150	±20	94.5	30	15	20	45
TCO B 0J 157 M8R-EW	6.3	5	8	150	±20	94.5	30	15	20	70
TCO B 0J 157 M8R-EC	6.3	5	8	150	±20	94.5	30	15	20	150
TCO B 0J 227 M8R-EN	6.3	5	8	220	±20	139	30	15	20	35
TCO B 0J 227 M8R-EW	6.3	5	8	220	±20	139	30	15	20	70
TCO B 0J 227 M8R-EC	6.3	5	8	220	±20	139	30	15	20	150
TCO B 1A 336 M8R-EW	10	8	13	33	±20	33	8	8	12	70
TCO B 1A 336 M8R-EC	10	8	13	33	±20	33	8	8	12	150
TCO B 1A 476 M8R-EW	10	8	13	47	±20	47	8	8	12	70
TCO B 1A 476 M8R-EC	10	8	13	47	±20	47	8	8	12	150
TCO B 1C 106 M8R	16	12.8	20	10	±20	16	8	8	12	150

＊= Under development
※Please consult a ROHM representative for additional details.

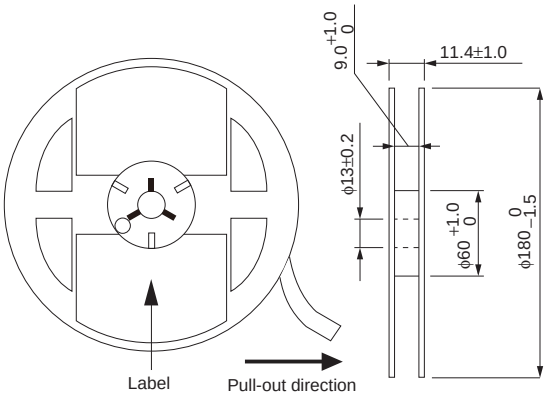
●Packaging specifications



(Unit : mm)

A	B	W	E	F	P1	P2	P0	D0	t1	t2	standard packaging quantity
3.3±0.1	3.8±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	4.0±0.1	φ1.5±0.1/0	0.25±0.05	2.2±0.1	2000pcs

●Reel dimensions

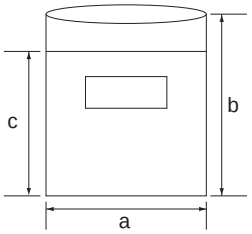


(Unit : mm)

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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