

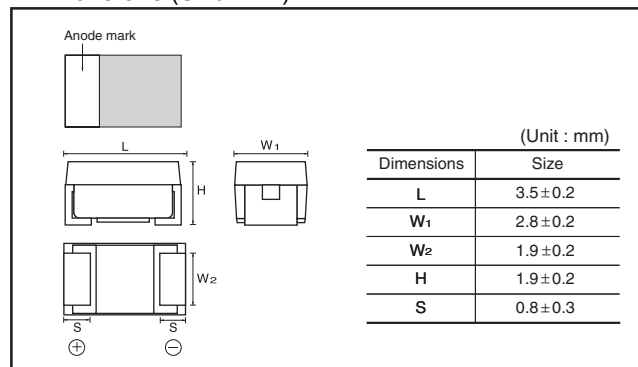
Chip tantalum capacitors (Fail-safe open structure type)

TCFG Series B Case

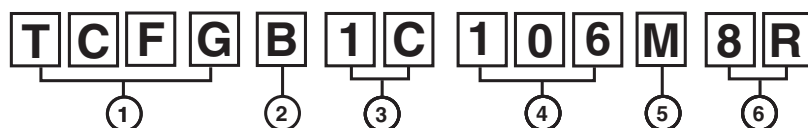
●Features

- 1) Safety design by open function built - in.
- 2) Wide capacitance range
- 3) Screening by thermal shock.

●Dimensions (Unit : mm)



●Product No. Explanation



- ① Series name
TCFG

- ② Case code
B

- ③ Rated voltage

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

- #### ④ Capacitance

Nominal capacitance in pF in 3 digits : 2significant figure representing the number of 0's.

- ⑤ Capacitance tolerance

M : $\pm 20\%$

- ## ⑥ Taping

8 : Reel width (8mm)

R : Positive electrode on the side opposite to sprocket hole

●Capacitance range

(μF)	Rated voltage (V.DC)						
	2.5	4	6.3	10	16	20	25
3.3 (335)					B	B *	B
4.7 (475)				B	B	B	B
6.8 (685)				B	B	B *	
10 (106)			B	B	B	B *	
15 (156)		B	B	B	B		
22 (226)		B	B	B	B		
33 (336)		B	B	B	B		
47 (476)		B	B	B			
68 (686)		B	B	B			
100 (107)		B	B	B			
150 (157)		B	B	B			
220 (227)	B	B	B				
330 (337)	B *	B *					

Remark) Case size codes (B) in the above show each size products line-up.

* : Under development

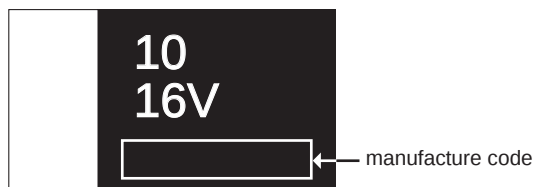
●Marking

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 A case, a voltage code is used as shown below.
- ③ Nominal capacitance

[B Case] note 1) Visual typical example (1) voltage code (2) capacitance code

10 16V
(1) (2)

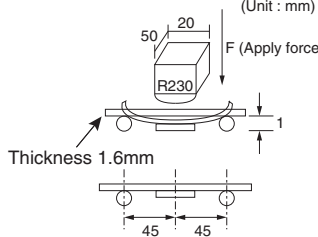
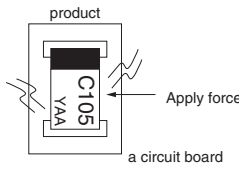


note 2) voltage code and capacitance code are variable with parts number

●Characteristics

Item		Performance							Test conditions (based on JIS C5101-1 and JIS C5101-3)															
Operating Temperature		-55 °C to +125 °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)		1.6	2.5	4	6.3	10	13	16	at 125°C															
Surge Voltage		3.2	5.0	8	13	20	26	32	at 85°C															
DC leakage current		0.5μA or 0.01CV whichever is greater (Shown in "Standard list")							As per 4.9 JIS C 5101-1 As per 4.5.1 JIS C 5101-3 Voltage : Rated voltage for 1 min															
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, tanδ)		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															
Impedance		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 : 260±5°C Duration : 5±0.5s Repetition : 1 After the specimens, leave it at room temperature for over 24h and then measure the sample.															
	L.C	TCFGB0G227M8R : Less than 150% of initial limit TCFGB0J227M8R : Less than 150% of initial limit TCFGB1A157M8R : Less than 150% of initial limit TCFGB1A107M8R : Less than 150% of initial limit TCFGB1E475M8R : Less than 150% of initial limit Others : Less than initial limit																						
	ΔC / C	TCFGB0G227M8R : Within ±15% of initial value TCFGB0J227M8R : Within ±15% of initial value TCFGB1A157M8R : Within ±15% of initial value TCFGB1A107M8R : Within ±15% of initial value TCFGB1E475M8R : Within ±10% of initial value Others : Within ± 5% of initial value																						
	tanδ	3.3 to 33μF : Less than initial limit 47 to 150μF : Less than 150% of initial limit TCFGB0E227M8R : Less than 200% of initial limit TCFGB0G227M8R : Less than 150% of initial limit TCFGB0J227M8R : Less than 150% of initial limit TCFGB1A157M8R : Less than 150% of initial limit TCFGB1A107M8R : Less than 150% of initial limit TCFGB1C336M8R : Less than 150% of initial limit																						
Fail-Safe open unit actuation		Within 320°C – 20s							Dip in the solder bath Solder temp : 320±5°C															
Temperature cycle	Appearance	There should be no significant abnormality.							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	TCFGB0G227M8R : Less than 150% of initial limit TCFGB0J227M8R : Less than 200% of initial limit TCFGB1A157M8R : Less than 200% of initial limit TCFGB1A107M8R : Less than 200% of initial limit TCFGB1E475M8R : Less than 150% of initial limit Others : Less than initial limit							<table><tr><th>Step</th><th>Temp.</th><th>Time</th></tr><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>125±2°C</td><td>30±3min</td></tr><tr><td>4</td><td>Room temp.</td><td>3min. or less</td></tr></table>	Step	Temp.	Time	1	-55±3°C	30±3min	2	Room temp.	3min. or less	3	125±2°C	30±3min	4	Room temp.	3min. or less
	Step	Temp.	Time																					
	1	-55±3°C	30±3min																					
2	Room temp.	3min. or less																						
3	125±2°C	30±3min																						
4	Room temp.	3min. or less																						
ΔC / C	TCFGB0E227M8R : Within ±15% of initial value TCFGB0G227M8R : Within ±15% of initial value TCFGB0J227M8R : Within ±20% of initial value TCFGB1A157M8R : Within ±20% of initial value TCFGB1A107M8R : Within ±20% of initial value Others : Within ±10% of initial value																							
tanδ	3.3 to 33μF : Less than initial limit 47 to 150μF : Less than 150% of initial limit TCFGB0G227M8R : Less than 150% of initial limit TCFGB0J227M8R : Less than 200% of initial limit TCFGB1A157M8R : Less than 200% of initial limit TCFGB1A107M8R : Less than 200% of initial limit TCFGB1C336M8R : Less than 150% of initial limit							After the specimens, leave it at room temperature for over 24h and then measure the sample.																
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															
	L.C	TCFGB0G227M8R : Less than 150% of initial limit TCFGB0J227M8R : Less than 200% of initial limit TCFGB1A157M8R : Less than 200% of initial limit TCFGB1A107M8R : Less than 200% of initial limit TCFGB1E475M8R : Less than 150% of initial limit Others : Less than initial limit							After leaving the sample under such atmospheric condition that the temperature and humidity are 60±2°C and 90 to 95%RH, respectively, for 500±12h level it at room temperature for over 24h and then measure the sample.															
	ΔC / C	TCFGB0G227M8R : Within ±15% of initial value TCFGB0J227M8R : Within ±20% of initial value TCFGB1A157M8R : Within ±20% of initial value TCFGB1A107M8R : Within ±20% of initial value Others : Within ±10% of initial value																						
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Item		Performance	Test conditions (based on JIS C5101-1 and JIS C5101-3)
Temperature Stability	Temp.	-55°C	As per 4.29 JIS C 5101-1 As per 4.13 JIS C 5101-3
	$\Delta C / C$	TCFGB0G227M8R : Within 0/-15% of initial value TCFGB0J227M8R : Within 0/-30% of initial value TCFGB1A157M8R : Within 0/-30% of initial value TCFGB1A107M8R : Within 0/-30% of initial value Others : Within 0/-12% of initial value	
	tan δ	Shall be satisfied the value on Table5	
	L.C	—	
	Temp.	+85°C	
	$\Delta C / C$	TCFGB0G227M8R : Within +12/0% of initial value TCFGB0J227M8R : Within +15/0% of initial value TCFGB1A157M8R : Within +15/0% of initial value TCFGB1A107M8R : Within +15/0% of initial value Others : Within +10/0% of initial value	
	tan δ	Shall be satisfied the value on Table5	
	L.C	Less than 1000% of initial limit	
	Temp.	+125°C	
	$\Delta C / C$	TCFGB0J227M8R : Within +20/0% of initial value TCFGB1A157M8R : Within +20/0% of initial value TCFGB1A107M8R : Within +20/0% of initial value TCFGB1C336M8R : Within +20/0% of initial value Others : Within +15/0% of initial value	
	tan δ	Shall be satisfied the value on Table5	
	L.C	Less than 1250% of initial limit	
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 1k Ω every 5 $\pm$ 0.5min. for 30 $\pm$ 5 s. each time in the atmospheric condition of 85 $\pm$ 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	TCFGB0G227M8R : Less than 150% of initial limit TCFGB0J227M8R : Less than 200% of initial limit TCFGB1A157M8R : Less than 200% of initial limit TCFGB1A107M8R : Less than 200% of initial limit TCFGB1E475M8R : Less than 150% of initial limit Others : Less than initial limit	
	$\Delta C / C$	TCFGB0E227M8R : Within $\pm$ 12% of initial value TCFGB0G227M8R : Within $\pm$ 15% of initial value TCFGB0J227M8R : Within $\pm$ 20% of initial value TCFGB1A157M8R : Within $\pm$ 20% of initial value TCFGB1A107M8R : Within $\pm$ 20% of initial value Others : Within $\pm$ 10% of initial value	
	tan δ	3.3 to 33 μ F : Less than initial limit 47 to 150 μ F : Less than 150% of initial limit TCFGB0G227M8R : Less than 200% of initial limit TCFGB0J227M8R : Less than 200% of initial limit TCFGB1A157M8R : Less than 200% of initial limit TCFGB1A107M8R : Less than 200% of initial limit TCFGB1C336M8R : 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 for 2000+72/0h without discontinuation via the serial resistance of 3 Ω or less at a temperature of 85 $\pm$ 2°C, leave the sample at room temperature/humidity for 1 to 2h and measure the value. After the specimens, leave it at room temperature for over 24h and then measure the sample.
	L.C	TCFGB0E227M8R : Less than 125% of initial limit TCFGB0G227M8R : Less than 150% of initial limit TCFGB0J227M8R : Less than 200% of initial limit TCFGB1A157M8R : Less than 200% of initial limit TCFGB1A107M8R : Less than 200% of initial limit TCFGB1E475M8R : Less than 150% of initial limit Others : Less than initial limit	
	$\Delta C / C$	TCFGB0G227M8R : Within $\pm$ 15% of initial value TCFGB0J227M8R : Within $\pm$ 20% of initial value TCFGB1A157M8R : Within $\pm$ 20% of initial value TCFGB1A107M8R : Within $\pm$ 20% of initial value Others : Within $\pm$ 10% of initial value	
	tan δ	3.3 to 33 μ F : Less than initial limit 47 to 100 μ F : Less than 150% of initial limit TCFGB0E227M8R : Less than 150% of initial limit TCFGB0G227M8R : Less than 200% of initial limit TCFGB0J227M8R : Less than 200% of initial limit TCFGB1A157M8R : Less than 200% of initial limit TCFGB1A107M8R : Less than 200% of initial limit TCFGB1C336M8R : Less than 150% of initial limit	

Item		Performance	Test conditions (based on JIS C5101-1 and JIS C5101-3)
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 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.) (Unit : mm) 
	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		Be based on "External dimensions"	Measure using a caliper of JIS B 7505 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. 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 list, TCFG series B Cases

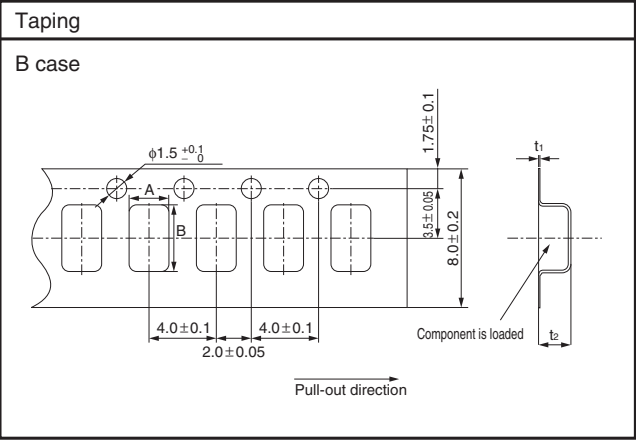
Part No.	Rated Voltage @ 85°C (V)	Derated Voltage @ 125°C (V)	Surge Voltage @ 85°C (V)	Capacitance 120Hz (μF)	Tolerance (%)	Leakage current 25°C 1WV.60s (μA)	DF 120Hz (%)			Impedance 100kHz (Ω)	Case code
							-55°C	25°C 85°C	125°C		
TCFG B 0E 227 M8R	2.5	1.6	3.2	220	±20	5.5	34	18	22	1.5	B
TCFG B 0G 156 M8R	4	2.5	5	15	±20	0.6	12	8	10	3.0	B
TCFG B 0G 226 M8R	4	2.5	5	22	±20	0.9	12	8	10	3.0	B
TCFG B 0G 336 M8R	4	2.5	5	33	±20	1.3	12	8	10	2.5	B
TCFG B 0G 476 M8R	4	2.5	5	47	±20	1.9	14	10	12	2.0	B
TCFG B 0G 686 M8R	4	2.5	5	68	±20	2.7	14	10	12	1.9	B
TCFG B 0G 107 M8R	4	2.5	5	100	±20	4.0	30	12	16	1.6	B
TCFG B 0G 157 M8R	4	2.5	5	150	±20	6.3	34	18	22	1.3	B
TCFG B 0G 227 M8R	4	2.5	5	220	±20	8.8	40	20	30	1.3	B
TCFG B 0J 106 M8R	6.3	4	8	10	±20	0.6	12	8	10	3.0	B
TCFG B 0J 156 M8R	6.3	4	8	15	±20	0.9	12	8	10	3.0	B
TCFG B 0J 226 M8R	6.3	4	8	22	±20	1.4	12	8	10	2.5	B
TCFG B 0J 336 M8R	6.3	4	8	33	±20	2.1	12	8	10	2.0	B
TCFG B 0J 476 M8R	6.3	4	8	47	±20	3.0	14	10	12	1.9	B
TCFG B 0J 686 M8R	6.3	4	8	68	±20	4.3	30	12	16	1.6	B
TCFG B 0J 107 M8R	6.3	4	8	100	±20	6.3	30	12	16	1.5	B
TCFG B 0J 157 M8R	6.3	4	8	150	±20	9.5	34	18	22	1.5	B
TCFG B 0J 227 M8R	6.3	4	8	220	±20	70	60	30	45	1.3	B
TCFG B 1A 475 M8R	10	6.3	13	4.7	±20	0.5	10	6	8	3.0	B
TCFG B 1A 685 M8R	10	6.3	13	6.8	±20	0.7	12	8	10	3.0	B
TCFG B 1A 106 M8R	10	6.3	13	10	±20	1.0	12	8	10	3.0	B
TCFG B 1A 156 M8R	10	6.3	13	15	±20	1.5	12	8	10	2.5	B
TCFG B 1A 226 M8R	10	6.3	13	22	±20	2.2	12	8	10	2.0	B
TCFG B 1A 336 M8R	10	6.3	13	33	±20	3.3	14	10	12	1.9	B
TCFG B 1A 476 M8R	10	6.3	13	47	±20	4.7	14	10	12	1.6	B
TCFG B 1A 686 M8R	10	6.3	13	68	±20	6.8	22	12	14	1.5	B
TCFG B 1A 107 M8R	10	6.3	13	100	±20	20	40	20	30	1.5	B
TCFG B 1C 335 M8R	16	10	20	3.3	±20	0.5	10	6	8	4.2	B
TCFG B 1C 475 M8R	16	10	20	4.7	±20	0.8	10	6	8	3.0	B
TCFG B 1C 685 M8R	16	10	20	6.8	±20	1.1	10	6	8	3.0	B
TCFG B 1C 106 M8R	16	10	20	10	±20	1.6	10	6	8	2.5	B
TCFG B 1C 156 M8R	16	10	20	15	±20	2.4	10	6	8	2.0	B
TCFG B 1C 226 M8R	16	10	20	22	±20	3.5	10	6	8	1.9	B
TCFG B 1C 336 M8R	16	10	20	33	±20	5.3	16	14	16	1.9	B
TCFG B 1D 335 M8R	20	13	26	3.3	±20	0.66	10	6	8	4.2	B
* TCFG B 1D 475 M8R	20	13	26	4.7	±20	1.0	10	6	8	3.0	B
* TCFG B 1D 106 M8R	20	13	26	10	±20	2.0	12	8	10	15.0	B
TCFG B 1E 335 M8R	25	16	32	3.3	±20	0.83	10	6	8	4.2	B
TCFG B 1E 475 M8R	25	16	32	4.7	±20	1.2	10	6	8	3.0	B

* = Under development

●Packaging specifications

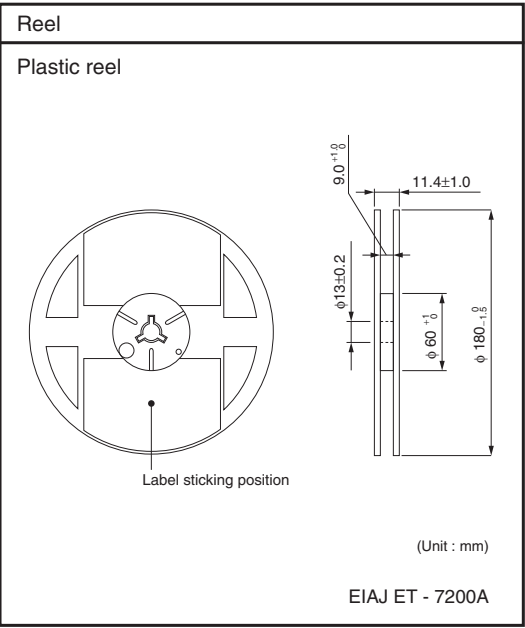
(Unit : mm)

Case code	A±0.1	B±0.1	t ₁ ±0.05	t ₂ ±0.1
B (3528)	3.3	3.8	0.25	2.2



●Packaging style

Case code	Packaging	Packaging style		Symbol	Basic ordering unit
B Case	Taping	Plastic taping	$\phi 180\text{mm}$ reel	8R	2,000



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