Data Sheet

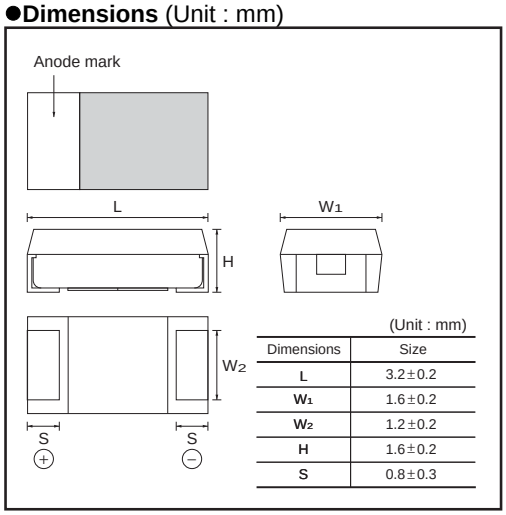
Chip tantalum capacitors (Fail-safe open structure type)

TCFG Series A Case

●Features

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

●Dimensions (Unit : mm)



(Unit : mm)

Dimensions	Size
L	3.2±0.2
W1	1.6±0.2
W2	1.2±0.2
H	1.6±0.2
S	0.8±0.3

●Part No. Explanation

T	C	F	G	A	0	J	1	0	6	M	8	R
①				②	③		④			⑤	⑥	

① Series name
TCFG

② Case code
A

③ Rated voltage

Rated voltage (V)	4	6.3	10	16	20	25
CODE	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 : ±20%

⑥ Taping
8 : Reel width (8mm)
R : Positive electrode on the side opposite to sprocket hole

●Capacitance range

(μF)	Rated voltage (V.DC)					
	4	6.3	10	16	20	25
1.0 (105)				A	A	A
1.5 (155)			A	A	A	A
2.2 (225)			A	A	A	A
3.3 (335)		A	A	A	A	A
4.7 (475)	A	A	A	A	A	A
6.8 (685)	A	A	A	A		
10 (106)	A	A	A	A		
15 (156)	A	A	A			
22 (226)	A	A	A			
33 (336)	A	A				
47 (476)	A	A				
68 (686)	A					

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

●Marking

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

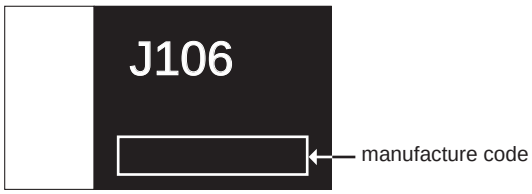
① Polarity : The polarity should be shown by□bar. (on the anode side)
② Rated DC voltage : Due to the small size of A case, a voltage code is used as shown below.
③ Nominal capacitance

Voltage Code	Rated Voltage(V)
G	4
J	6.3
A	10
C	16
D	20
E	25

Capacitance Code	Nominal Capacitance (μF)
105	1.0
155	1.5
225	2.2
335	3.3
475	4.7
685	6.8
106	10
156	15
226	22
336	33
476	47
686	68

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

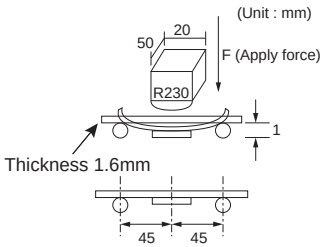
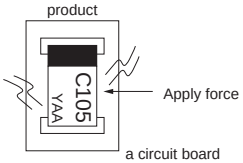
$\frac{J}{(1)}$ $\frac{106}{(2)}$



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

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)		4 | 6.3 | 10 | 16 | 20 | 25	at 85°C
Category Voltage (V.DC)		2.5 | 4 | 6.3 | 10 | 13 | 16	at 125°C
Surge Voltage		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 1min
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
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	Less than initial limit	
	ΔC / C	Within ±5% of initial value	
	tanδ	Less than 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. 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. After the specimens, leave it at room temperature for over 24h and then measure the sample.
	L.C	Less than initial limit	
	ΔC / C	TCFGA1A226M8R : Within ±15% of initial value TCFGA0J476M8R : Within ±15% of initial value TCFGA0G686M8R : Within ±15% of initial value Others : Within ±10% of initial value	
	tanδ	Less than initial limit	
Moisture resistance	Appearance	There should be no significant abnormality. The indications should be clear.	As per 4.12 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 to 95%RH, respectively, for 500±12h level it at room temperature for over 24h and then measure the sample.
	L.C	Less than initial limit	
	ΔC / C	Within ±10% of initial value	
	tanδ	Less than initial limit	

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

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
	ΔC / C	Within 0/–12%of initial value	
	tanδ	Shall be satisfied the voltage on "Standard list"	
	L.C	–	
	Temp.	+85°C	
	ΔC / C	Within +10/0%of initial value	
	tanδ	Shall be satisfied the voltage on "Standard list"	
	L.C	Less than 1000% of initial limit	
	Temp.	+125°C	
	ΔC / C	Within +15/0%of initial value	
	tanδ	Shall be satisfied the voltage on "Standard list"	
	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 1kΩ every 5±0.5min. 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 initial limit	
	ΔC / C	Within ±10%of initial value	
	tanδ	Less than 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 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 initial limit	
	ΔC / C	TCFGA1A226M8R : Within ±15% of initial value TCFGA0J476M8R : Within ±15% of initial value TCFGA0G686M8R: Within ±15% of initial value Others : Within ±10% of initial value	
	tanδ	Less than 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. 

Item		Performance	Test conditions (based on JIS C5101-1 and JIS C5101-3)
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	The measured value should be stable.	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 A Cases**

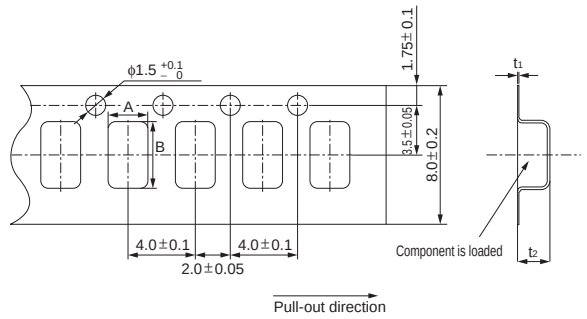
Part No.	Rated Voltage @85°C (V)	Derated Voltage @125°C (V)	Surge Voltage @85°C (V)	Capacitance 120Hz (µF)	Tolerance (%)	Leakage current 25°C 1WV.60s (µA)	DF 120Hz (%)			Impedance 100kHz	Case code
							−55°C	25°C 85°C	125°C	(Ω)	
TCFG A 0G 475 M8R	4	2.5	5	4.7	±20	0.5	10	6	8	5.6	A
TCFG A 0G 685 M8R	4	2.5	5	6.8	±20	0.5	12	8	10	4.9	A
TCFG A 0G 106 M8R	4	2.5	5	10	±20	0.5	12	8	10	4.2	A
TCFG A 0G 156 M8R	4	2.5	5	15	±20	0.6	12	8	10	4.0	A
TCFG A 0G 226 M8R	4	2.5	5	22	±20	0.9	12	8	10	3.0	A
TCFG A 0G 336 M8R	4	2.5	5	33	±20	1.3	14	10	12	3.5	A
TCFG A 0G 476 M8R	4	2.5	5	47	±20	1.9	30	12	16	3.2	A
TCFG A 0G 686 M8R	4	2.5	5	68	±20	3.0	32	16	20	3.0	A
TCFG A 0J 335 M8R	6.3	4	8	3.3	±20	0.5	10	6	8	5.6	A
TCFG A 0J 475 M8R	6.3	4	8	4.7	±20	0.5	12	8	10	4.9	A
TCFG A 0J 685 M8R	6.3	4	8	6.8	±20	0.5	12	8	10	4.2	A
TCFG A 0J 106 M8R	6.3	4	8	10	±20	0.6	12	8	10	4.0	A
TCFG A 0J 156 M8R	6.3	4	8	15	±20	0.9	12	8	10	3.0	A
TCFG A 0J 226 M8R	6.3	4	8	22	±20	1.4	14	10	12	3.5	A
TCFG A 0J 336 M8R	6.3	4	8	33	±20	2.1	30	12	16	3.2	A
TCFG A 0J 476 M8R	6.3	4	8	47	±20	3.0	34	18	24	3.2	A
TCFG A 1A 155 M8R	10	6.3	13	1.5	±20	0.5	10	6	8	8.8	A
TCFG A 1A 225 M8R	10	6.3	13	2.2	±20	0.5	10	6	8	5.6	A
TCFG A 1A 335 M8R	10	6.3	13	3.3	±20	0.5	12	8	10	4.9	A
TCFG A 1A 475 M8R	10	6.3	13	4.7	±20	0.5	12	8	10	4.2	A
TCFG A 1A 685 M8R	10	6.3	13	6.8	±20	0.7	12	8	10	4.0	A
TCFG A 1A 106 M8R	10	6.3	13	10	±20	1.0	12	8	10	3.0	A
TCFG A 1A 156 M8R	10	6.3	13	15	±20	1.5	14	10	12	3.5	A
TCFG A 1A 226 M8R	10	6.3	13	22	±20	2.2	30	12	16	3.2	A
TCFG A 1C 105 M8R	16	10	20	1.0	±20	0.5	10	6	8	7	A
TCFG A 1C 155 M8R	16	10	20	1.5	±20	0.5	10	6	8	5.6	A
TCFG A 1C 225 M8R	16	10	20	2.2	±20	0.5	10	6	8	4.9	A
TCFG A 1C 335 M8R	16	10	20	3.3	±20	0.5	10	6	8	4.8	A
TCFG A 1C 475 M8R	16	10	20	4.7	±20	0.8	10	6	8	3.9	A
TCFG A 1C 685 M8R	16	10	20	6.8	±20	1.1	10	6	8	3.8	A
TCFG A 1C 106 M8R	16	10	20	10	±20	1.6	12	8	10	3.5	A
TCFG A 1D 105 M8R	20	13	26	1.0	±20	0.5	10	6	8	7	A
TCFG A 1D 155 M8R	20	13	26	1.5	±20	0.5	10	6	8	6.0	A
TCFG A 1D 255 M8R	20	13	26	2.2	±20	0.5	10	6	8	5.2	A
TCFG A 1D 335 M8R	20	13	26	3.3	±20	0.7	10	6	8	4.8	A
TCFG A 1D 475 M8R	20	13	26	4.7	±20	0.9	10	6	8	3.9	A
TCFG A 1E 105 M8R	25	16	32	1.0	±20	0.5	10	6	8	7	A
TCFG A 1E 155 M8R	25	16	32	1.5	±20	0.5	10	6	8	6.0	A
TCFG A 1E 255 M8R	25	16	32	2.2	±20	0.6	10	6	8	5.2	A
TCFG A 1E 335 M8R	25	16	32	3.3	±20	0.8	10	6	8	4.8	A
TCFG A 1E 475 M8R	25	16	32	4.7	±20	1.2	12	8	10	3.4	A

●Packaging specifications

Case code	A±0.1	B±0.1	t_1±0.05	t_2±0.1
A (3216)	1.9	3.5	0.25	1.9

Taping

A case

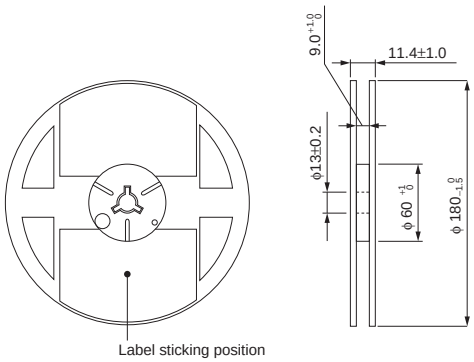


●Packaging style

Case code	Packaging	Packaging style		Symbol	Basic ordering unit
A Case	Taping	Plastic taping	ϕ180mm reel	8R	2,000

Reel

Plastic reel



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