

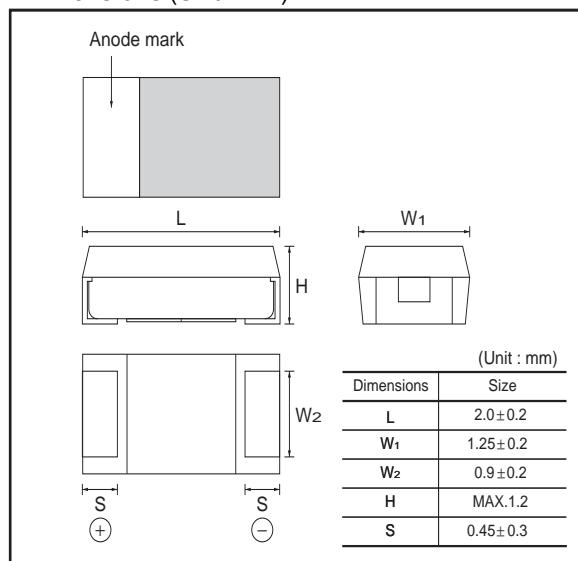
## Chip tantalum capacitors (Fail-safe open structure type)

## TCFG series P Case

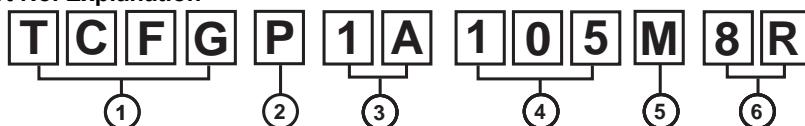
## ●Features

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

## ●Dimensions (Unit : mm)



## ●Part No. Explanation



① Series name  
TCFG

④ Capacitance  
Nominal capacitance in pF in 3 digits : 2 significant figure representing the number of 0's.

② Case code  
P

⑤ Capacitance tolerance  
M : ±20%

③ Rated Voltage

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

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)			P	P	P	P
1.5 (155)		P	P	P		
2.2 (225)	P	P	P	P		
3.3 (335)	P	P	P	P		
4.7 (475)	P	P	P			
6.8 (685)	P	P	P			
10 (106)	P	P	P			
15 (156)	P	P				
22 (226)	P					
33 (336)						
47 (476)						
68 (686)						

Remark) Case size codes (P) 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 P case, a voltage code is used as shown below.
- ③ Nominal capacitance

Voltage Code	Rated DC Voltage (V)
g	4
j	6.3
A	10
C	16
D	20
E	25

Capacitance Code	Nominal Capacitance (μF)
A	1.0
E	1.5
J	2.2
N	3.3
S	4.7
W	6.8
a	10
e	15
j	22

Visual typical example (1) voltage code (2) capacitance code

[P Case] note 1) j (1) J (2)

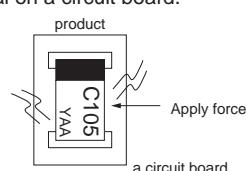
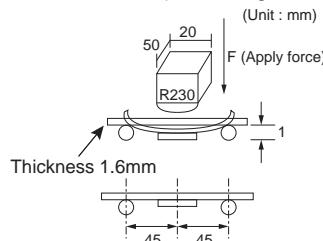


note 2) voltage code and capacitance code are variable with parts number

## ●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)	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	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.						
	L.C	Less than initial limit						
	ΔC / C	Within ±10% of initial value						
	tanδ	Less than 150% of initial limit						
Fail-Safe open unit actuation		Within 320°C – 20s						
Temperature cycle	Appearance	There should be no significant abnormality. The indications should be clear.						
	L.C	Less than initial limit						
	ΔC / C	1 to 10μF : within ±10% of initial value 15 to 22μF : within ±20% of initial value						
	tanδ	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.						
	L.C	Less than initial limit						
	ΔC / C	Within ±20% of initial value						
	tanδ	Less than 150% 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/-15% of initial value	
	tanδ	Shall be satisfied the voltage on "Standard list"	
	L.C	—	
	Temp.	+85°C	
	ΔC / C	Within +15/0% 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 +20/0% of initial value	
Surge Voltage	Appearance	There should be no significant abnormality.	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	Shall be satisfied the voltage on "Standard list"	
	ΔC / C	Within ±10% of initial value	
	tanδ	Less than 150% of initial limit	
Loading at High temperature	Appearance	There should be no significant abnormality.	As per 4.23 JIS C 5101-1 As per 4.15 JIS C 5101-3 After applying the rated voltage for 1000+36/0h 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	Within ±10% of initial value	
	tanδ	Less than 150% 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 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.



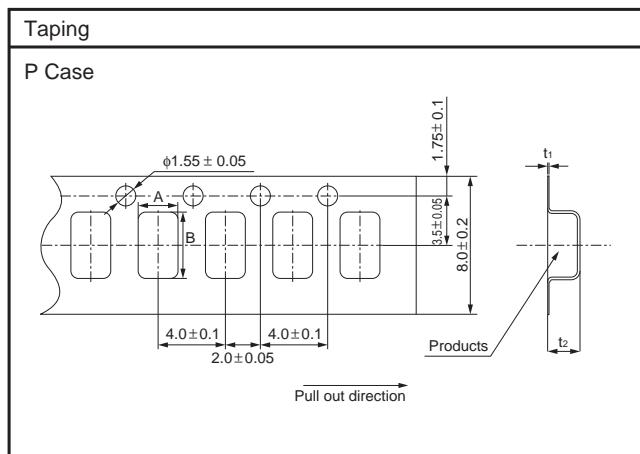
Item	Performance	Test conditions (based on JIS C5101-1 and JIS C5101-3)
Dimensions	Be based on "Dimensions"	Measure using a caliper of JIS B 7505 Class 2 or higher grade.
Resistance to solvents	The indication should be clear.	As per 4.32 JIS C 5101-1 As per 4.18 JIS C 5101-3 Dip in the isopropyl alcohol 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.
	Appearance	There should be no significant abnormality.

●Table 1 standard list, TCFG series P Case

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 (mA)	DF120Hz (%)			Impedance 100kHz (Ω)	Case code
							-55°C	25°C 85°C	125°C		
TCFG P 0G 225 M8R	4	2.5	5	2.2	±20	0.5	15	10	15	17.5	P
TCFG P 0G 335 M8R	4	2.5	5	3.3	±20	0.5	30	20	30	17.5	P
TCFG P 0G 475 M8R	4	2.5	5	4.7	±20	0.5	30	20	30	14.4	P
TCFG P 0G 685 M8R	4	2.5	5	6.8	±20	0.5	30	20	30	11.8	P
TCFG P 0G 106 M8R	4	2.5	5	10	±20	0.5	30	20	30	9.3	P
TCFG P 0G 156 M8R	4	2.5	5	15	±20	0.6	30	20	30	8.3	P
TCFG P 0G 226 M8R	4	2.5	5	22	±20	0.9	30	20	30	7.7	P
TCFG P 0J 155 M8R	6.3	4	8	1.5	±20	0.5	15	10	15	17.5	P
TCFG P 0J 225 M8R	6.3	4	8	2.2	±20	0.5	30	20	30	17.5	P
TCFG P 0J 335 M8R	6.3	4	8	3.3	±20	0.5	30	20	30	14.4	P
TCFG P 0J 475 M8R	6.3	4	8	4.7	±20	0.5	30	20	30	11.8	P
TCFG P 0J 685 M8R	6.3	4	8	6.8	±20	0.5	30	20	30	9.3	P
TCFG P 0J 106 M8R	6.3	4	8	10	±20	0.6	30	20	30	8.3	P
TCFG P 0J 156 M8R	6.3	4	8	15	±20	0.9	30	20	30	7.7	P
TCFG P 1A 105 M8R	10	6.3	13	1.0	±20	0.5	15	10	15	17.5	P
TCFG P 1A 155 M8R	10	6.3	13	1.5	±20	0.5	30	20	30	16.1	P
TCFG P 1A 225 M8R	10	6.3	13	2.2	±20	0.5	30	20	30	14.4	P
TCFG P 1A 335 M8R	10	6.3	13	3.3	±20	0.5	30	20	30	11.8	P
TCFG P 1A 475 M8R	10	6.3	13	4.7	±20	0.5	30	20	30	9.3	P
TCFG P 1A 685 M8R	10	6.3	13	6.8	±20	0.7	30	20	30	8.3	P
TCFG P 1A 106 M8R	10	6.3	13	10	±20	1.0	30	20	30	7.7	P
TCFG P 1C 105 M8R	16	10	20	1.0	±20	0.5	15	10	15	16.1	P
TCFG P 1C 155 M8R	16	10	20	1.5	±20	0.5	30	20	30	14.4	P
TCFG P 1C 225 M8R	16	10	20	2.2	±20	0.5	30	20	30	11.8	P
TCFG P 1C 335 M8R	16	10	20	3.3	±20	0.6	30	20	30	9.3	P
TCFG P 1D 105 M8R	20	13	26	1.0	±20	0.5	15	10	15	16.1	P
TCFG P 1E 105 M8R	25	16	32	1.0	±20	0.5	15	10	15	16.1	P

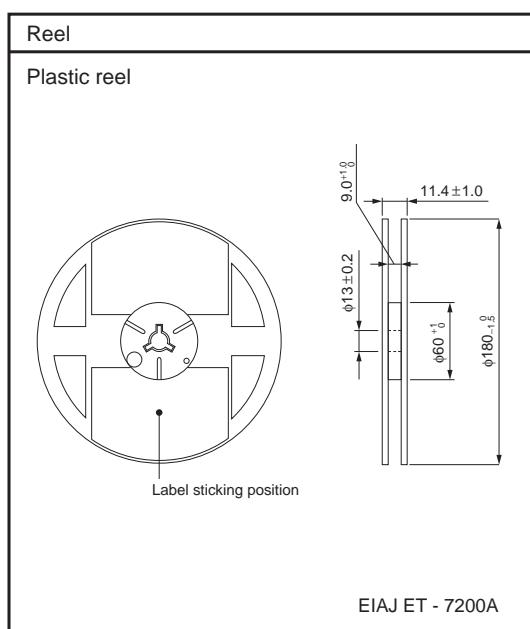
## ●Packaging specifications

Case code	A $\pm$ 0.1	B $\pm$ 0.1	t <sub>1</sub> $\pm$ 0.05	t <sub>2</sub> $\pm$ 0.1
P (2012)	1.55	2.3	0.25	1.32



## ●Packaging style

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



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