

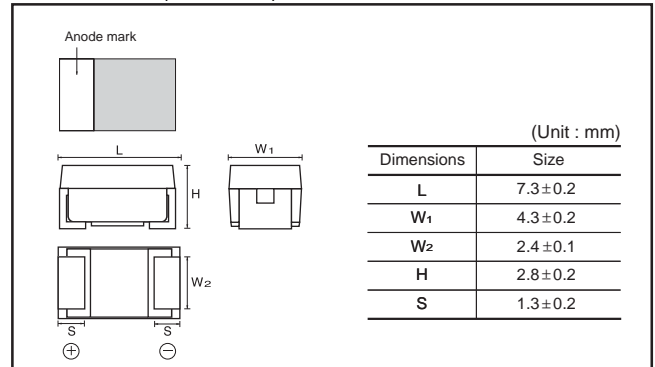
Chip tantalum capacitors with (Fail-safe open structure type)

TCFG series D Case

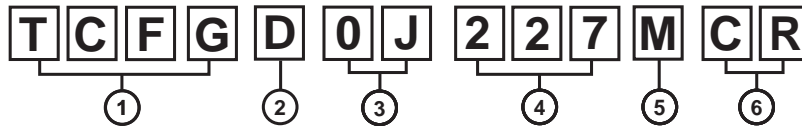
●Features

- 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

② Case code
D

③ Rated Voltage

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

④ Capacitance

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

⑤ Capacitance tolerance

M : ±20%

⑥ Taping

C : Reel width (12mm)
R : Positive electrode on the side opposite to sprocket hole

●Capacitance range

(μF)	Rated voltage (V.DC)						
	4	6.3	10	16	20	25	35
22 (226)							D
33 (336)							
47 (476)						D	
68 (686)					D *		
100 (107)				D			
150 (157)			D				
220 (227)		D					
330 (337)	D *						

Remark) Case size codes (D) in the above shown each size products line-up.

* : Under development

●Marking

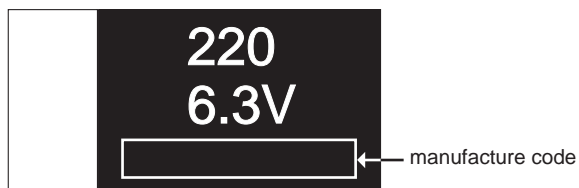
The indication listed below should be given on the surface of a capacitor.

- ① Polarity : The polarity should be shown by □ bar. (on the anode side)
- ② Rated DC voltage
- ③ Nominal capacitance

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

(1) 220μF

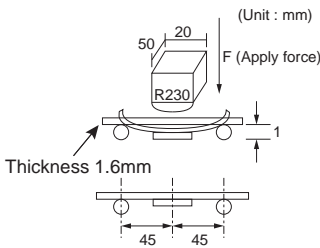
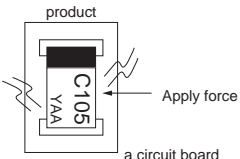
(2) 6.3V



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 35	at 85°C															
Category Voltage (V.DC)		2.5 4 6.3 10 13 16 22	at 125°C															
Surge Voltage		5.0 8 13 20 26 32 44	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, +1.5 to 2V.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, +1.5 to 2V.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±10°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	TCFGD1E476 □ : Less than 150% of initial limit Others : Less than initial limit																
	ΔC / C	Within ±12% of initial value																
	tanδ	Less than 150% of initial limit																
Fail-Safe open unit actuation		Within 330°C – 20s	Dip in the solder bath Solder temp : 330±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. <table border="1" data-bbox="868 1373 1195 1532"> <thead> <tr> <th>Step</th> <th>Temp.</th> <th>Time</th> </tr> </thead> <tbody> <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> </tbody> </table> After the specimens, leave it at room temperature for over 24h and then measure the sample.	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																
L.C	TCFGD1E476 □ : Less than 150% of initial limit Others : Less than initial limit																	
ΔC / C	Within ±20% of initial value																	
tanδ	Less than 150% of initial limit																	
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 to 95%RH, respectively, for 500±12h level it at room temperature for over 24h and then measure the sample.															
	L.C	TCFGD1E476 □ : Less than 150% of initial limit Others : 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 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/-20%of initial value	
	tanδ	Shall be satisfied the voltage on "Standard list"	
	L.C	-	
	Temp.	+85°C	
	ΔC / C	Within +12/0%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	
	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.	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	TCFGD1E476 □ : Less than 150% of initial limit Others : Less than initial limit	
	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 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	TCFGD1E476 □ : Less than 150% of initial limit Others : Less than 125% of 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.) <div style="text-align: center;">  <p>(Unit : mm)</p> </div>
	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. <div style="text-align: center;">  </div>	

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	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	

●Table 1 standard list, TCFG series D Case

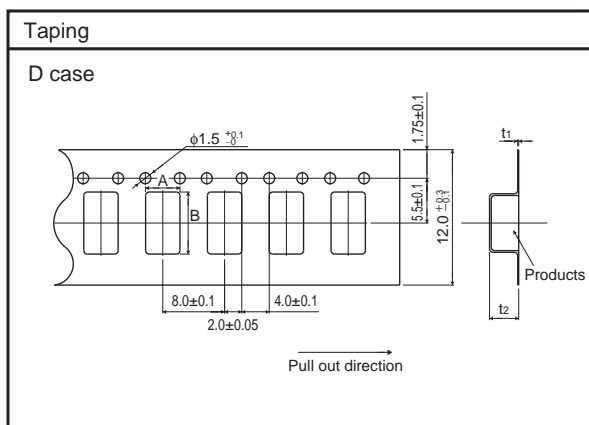
Part No.	Rated Voltage @85°C (V)	Derated Voltage @125°C (V)	Surge Voltage @85°C (V)	Capacitance 120Hz (μF)	Tolerance (%)	Leakage current 25°C 1VV.60s (mA)	DF120Hz (%)			Impedance 100kHz (Ω)	Case code
							-55°C	25°C 85°C	125°C		
*TCFG D 0G 337 MCR	4	2.5	5	330	±20	13.2	32	14	20	0.7	D
TCFG D 0J 227 MCR	6.3	4	8	220	±20	13.8	30	12	16	0.7	D
TCFG D 1A 157 MCR	10	6.3	13	150	±20	15.0	14	10	12	0.7	D
TCFG D 1C 107 MCR	16	10	20	100	±20	16	14	10	12	0.7	D
TCFG D 1E 476 MCR	25	16	32	47	±20	11.8	14	10	12	0.7	D
TCFG D 1V 226 MCR	35	22	44	22	±20	7.7	14	10	12	0.8	D

* = Under development

●Packaging specifications

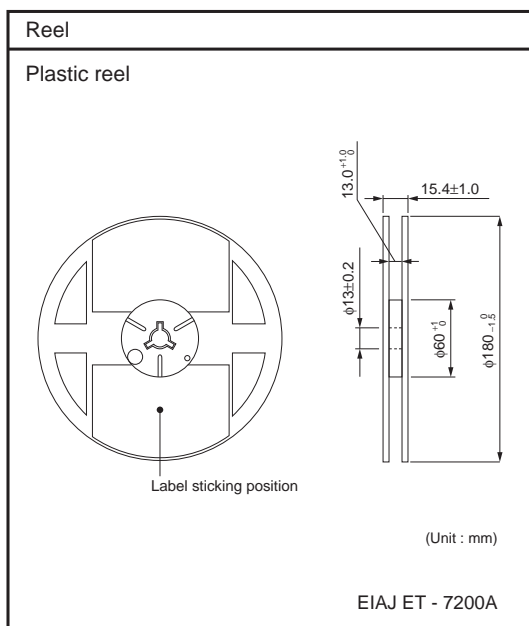
Taping (Unit : mm)

Case code	A±0.1	B±0.1	t ₁ ±0.05	t ₂ ±0.1
D	4.9	7.7	0.3	3.3



●Packaging style

Case size	Packaging	Packaging style		Symbol	Basic ordering unit
D Case	Taping	Plastic taping	φ180mm reel	CR	500



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