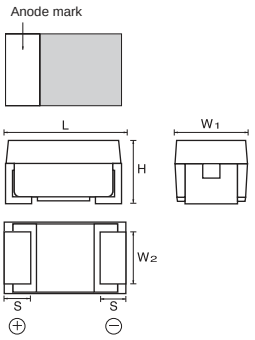
Chip tantalum capacitors with (Fail-safe open structure type)

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)



(Unit : mm)

Dimensions	Size
L	7.3±0.2
W1	4.3±0.2
W2	2.4±0.1
H	2.8±0.2
S	1.3±0.2

●Part No. Explanation

T	C	F	G	D	0	J	2	2	7	M	C	R
①				②	③		④			⑤	⑥	

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

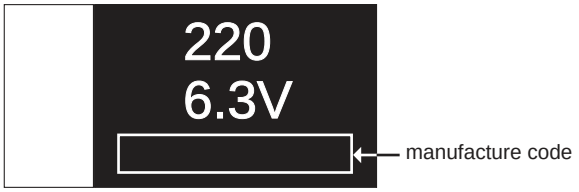
The indication listed below should be given on the surface of a capacitor.

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

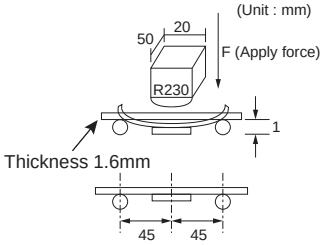
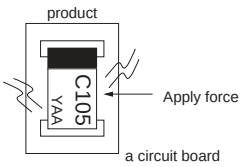
(2) 6.3V



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. Step 1: –55±3°C 30±3min Step 2: Room temp. 3min. or less Step 3: 125±2°C 30±3min Step 4: Room temp. 3min. or less 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 ±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.) 
	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	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.	

●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 1WV.60s (mA)	DF120Hz (%)			Impedance 100kHz	Case code
							–55°C	25°C 85°C	125°C	(Ω)	
∗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

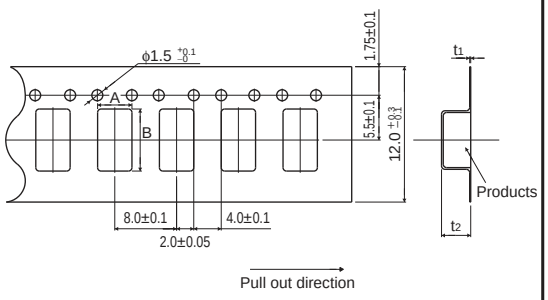
Taping

(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

Taping

D case

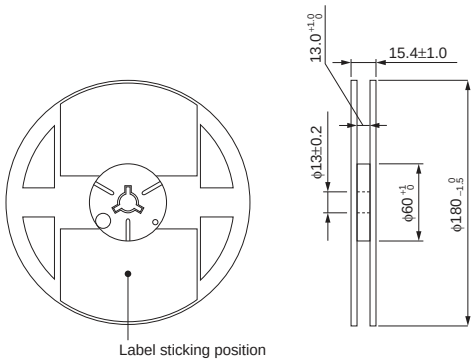


●Packaging style

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

Reel

Plastic reel



(Unit : mm)

EIAJ ET - 7200A

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