

# Chip tantalum capacitors (Bottom surface electrode type)

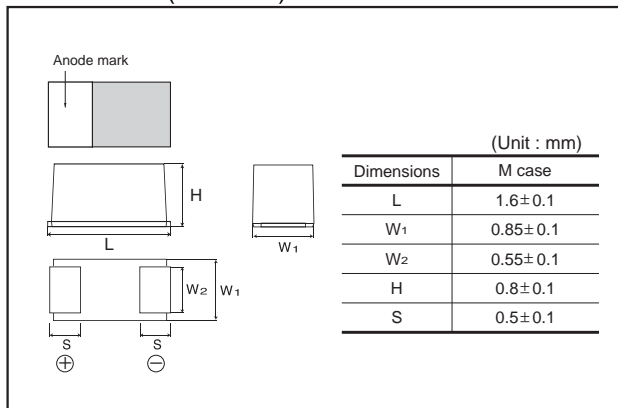
## TC Series M Case

### ●Features (M)

With an original bottom surface electrode structure.

- 1) Excellent adhesion.
- 2) Easy visual recognition of fillets.
- 3) Large capacitance, low ESR.

### ●Dimensions (Unit : mm)



### ●Part No. Explanation



① Series name  
TC

② Case style  
TC..... M

③ Rated voltage

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

④ Nominal capacitance

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

⑤ Capacitance tolerance

M : ±20%

⑥ Taping

8 : Tape width

R : Positive electrode on the side opposite to sprocket hole

● Rated table

(μF)	Rated voltage (V)					
	2.5 0E	4 0G	6.3 0J	10 1A	16 1C	20 1D
0.47 (474)			M*	M*		
0.68 (684)						
1.0 (105)				M	M	
1.5 (155)						
2.2 (225)				M	M	
3.3 (335)						
4.7 (475)		M	M	M		
6.8 (685)						
10 (106)		M	M	M		
15 (156)						
22 (226)		M	M*			
33 (336)		M				
47 (476)	M*					
68 (686)						

Remark) Case size codes (M) in the above show products line-up.  
\* Under development

● Marking

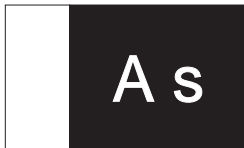
The indications listed below should be given on the surface of a capacitor.

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

Voltage Code	Rated DC Voltage (V)
e	2.5
g	4
j	6.3
A	10
C	16

Capacitance Code	Nominal Capacitance (μF)
<u>S</u>	0.47
<u>W</u>	0.68
A	1.0
E	1.5
J	2.2
N	3.3
S	4.7
W	6.8
a	10
e	15
j	22
n	33
s	47

[M case] note 1)  $\frac{A}{(1)} \frac{s}{(2)}$

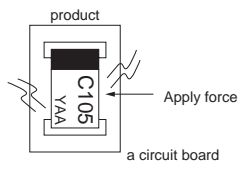


note 2) voltage code and capacitance code are variable with parts number

● Characteristics

Item		Performance	Test conditions (based on JIS C 5101-1 and JIS C 5101-3)															
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 (VDC)		2.5 4 6.3 10 16	at 85°C															
Category voltage (VDC)		1.6 2.5 4 6.3 10	at 125°C															
Surge voltage (VDC)		3.2 5.2 8 13 20	at 85°C															
DC Leakage current		Shall be satisfied the voltage on " Standard list "	As per 4.9 JIS C 5101-1 As per 4.5.1 JIS C 5101-3 Voltage : Rated voltage for 5min															
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.DC Measuring circuit : DC Equivalent series circuit															
Tangent of loss angle (Df, tan δ)		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.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.	Less than 200% of initial limit																
	ΔC / C	Within ±20% of initial value																
	Df (tan δ)	Less than 200% of initial limit																
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. <table border="1" data-bbox="863 1216 1166 1373"> <thead> <tr> <th></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.		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
		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.	Less than 200% of initial limit																	
ΔC / C	Within ±20% of initial value																	
Df (tan δ)	Less than 200% 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 leave it at room temperature for over 24h and then measure the sample.															
	L.C.	Less than 200% of initial limit																
	ΔC / C	Within ±20% of initial value																
	Df (tan δ)	Less than 200% of initial limit																

Item	Performance	Test conditions (based on JIS C 5101-1 and JIS C 5101-3)
Temperature Stability	Temp.	-55°C
	ΔC / C	TCM0G336□ : Within 0/-30% of initial value Others : Within 0/-15% of initial value
	Df (tan δ)	Shall be satisfied the voltage on " Standard list "
	L.C.	-
	Temp.	+85°C
	ΔC / C	TCM0G336□ : Within +15/-5% of initial value Others : Within +15/0% of initial value
	Df (tan δ)	Shall be satisfied the voltage on " Standard list "
	L.C.	TCM0G336□ : Less than 1.0CV Others : 5μA or 0.1CV whichever is greater
	Temp.	+125°C
	ΔC / C	TCM0G336□ : Within +20/-5% of initial value Others : Within +20/0% of initial value
Surge voltage	Appearance	There should be no significant abnormality.
	L.C.	Less than 200% of initial limit
	ΔC / C	Within ±20% of initial value
	Df (tan δ)	Less than 200% of initial limit
Loading at High temperature	Appearance	There should be no significant abnormality.
	L.C.	Less than 200% of initial limit
	ΔC / C	TCM0G336□ : Within ±30% of initial value Others : Within ±20% of initial value
	Df (tan δ)	Less than 200% of initial limit
Terminal strength	Capacitance	The measured value should be stable.
	Appearance	There should be no significant abnormality.
		As per 4.29 JIS C 5101-1 As per 4.13 JIS C 5101-3  As per 4.26 JIS C 5101-1 As per 4.14 JIS C 5101-3 Apply the specified surge voltage every 5±0.5 min. 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.  As per 4.23 JIS C 5101-1 As per 4.15 JIS C 5101-3 After applying the rated voltage for 1000+36/0 h 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.  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)
		<p>(Unit : mm)</p> <p>thickness=1.6mm</p> <p>45 45 1</p> <p>50 20</p> <p>R230</p> <p>F (Apply force)</p>

Item	Performance	Test conditions (JIS C 5101-1 and JIS C 5101-3)
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	Refer to "External dimensions"	Measure using a caliper of JIS B 7507 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 1 h. 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.
		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.

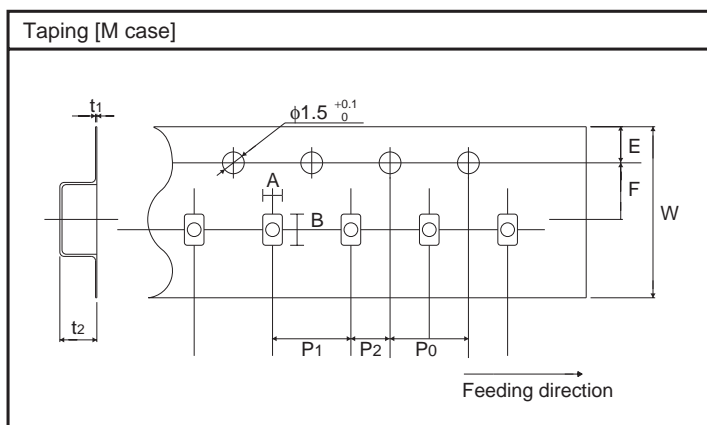
● Standard products list, TC series M case

Part No.	Rated voltage 85°C (V)	Category voltage 125°C (V)	Surge voltage 85°C (V)	Cap. 120Hz (μF)	Tolerance (%)	Leakage current 25°C 1WV.300s (μA)	Df 120Hz (%)			Impedance 100kHz (Ω)
							-55°C	25°C 85°C	125°C	
TC M 0G 475□	4	2.5	5.2	4.7	±20	0.5	30	20	30	9.0
TC M 0G 106□	4	2.5	5.2	10	±20	0.5	30	20	30	9.0
TC M 0G 226□	4	2.5	5.2	22	±20	0.9	30	20	30	9.0
TC M 0G 336□	4	2.5	5.2	33	+20	13.0	60	30	40	9.0
TC M 0J 474□	6.3	4	8	0.47	±20	0.5	15	10	15	15.0
TC M 0J 475□	6.3	4	8	4.7	±20	0.5	30	20	30	9.0
TC M 0J 106□	6.3	4	8	10	±20	0.6	30	20	30	9.0
TC M 0J 226□	6.3	4	8	22	±20	13.0	60	30	40	9.0
TC M 1A 474□	10	6.3	13	0.47	±20	0.5	15	10	15	15.0
TC M 1A 105□	10	6.3	13	1.0	±20	0.5	15	10	15	15.0
TC M 1A 225□	10	6.3	13	2.2	±20	0.5	30	20	30	13.5
TC M 1A 475□	10	6.3	13	4.7	±20	0.5	30	20	30	9.0
TC M 1A 106□	10	6.3	13	10	±20	10.0	30	20	30	9.0
TC M 1C 105□	16	10	20	1.0	±20	0.5	15	10	15	15.0
TC M 1C 225□	16	10	20	2.2	±20	0.5	30	20	30	13.5

□=Tolerance (M : ±20% )

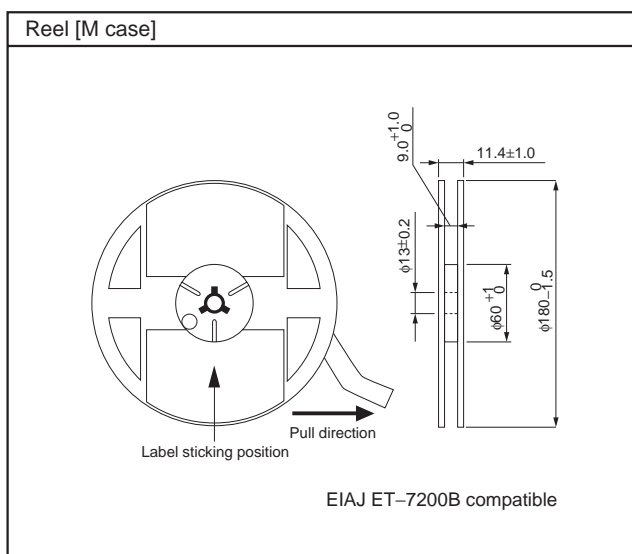
● Packaging specifications

Case code	A±0.1	B±0.1	W±0.2	E±0.1	F±0.05	P1±0.1	P2±0.05	P0±0.1	t1±0.05	t2±0.1
M	1.0	1.8	8.0	1.75	3.5	4.0	2.0	4.0	0.20	1.0



● Packaging style

Case code	Packaging	Packaging style		Symbol	Basic ordering units
M case	Taping	plastic taping	φ180mm Reel	R	4,000pcs



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