

Chip tantalum capacitors

(Bottom surface electrode type)

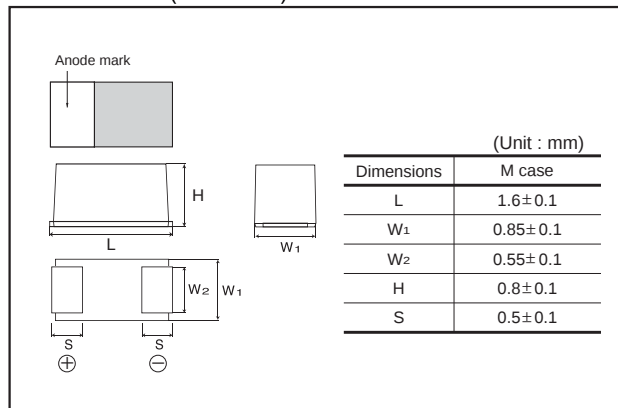
TC Series M Case

●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)	Capacitance Code	Nominal Capacitance (μF)
e	2.5	<u>S</u>	0.47
g	4	<u>W</u>	0.68
j	6.3	A	1.0
A	10	E	1.5
C	16	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) A s
 (1) (2)

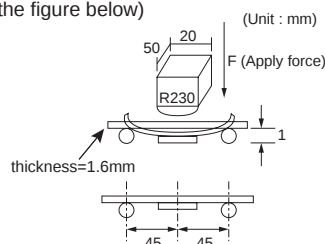


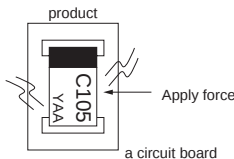
note 2) voltage code and capacitance code are variable with parts number

● 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><tr><td></td><td>Temp.</td><td>Time</td></tr><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></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	As per 4.29 JIS C 5101-1 As per 4.13 JIS C 5101-3
	$\Delta C / C$	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	
	$\Delta C / C$	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 : 5 μ A or 0.1CV whichever is greater	
	Temp.	+125°C	
	$\Delta C / C$	TCM0G336□ : Within +20/-5% of initial value Others : 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 every 5 $\pm$ 0.5 min. for 30 $\pm$ 5 s. each time in the atmospheric condition of 85 $\pm$ 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 200% of initial limit	
	$\Delta C / C$	Within $\pm$ 20% of initial value	
	Df (tan δ)	Less than 200% 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+36/0 h without discontinuation via the serial resistance of 3 Ω or less at a temperature of 85 $\pm$ 2°C, leave the sample at room temperature / humidity for over 24h and measure the value.
	L.C.	Less than 200% of initial limit	
	$\Delta C / C$	TCM0G336□ : Within $\pm$ 30% of initial value Others : Within $\pm$ 20% of initial value	
	Df (tan δ)	Less than 200% 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.	



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.	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.	

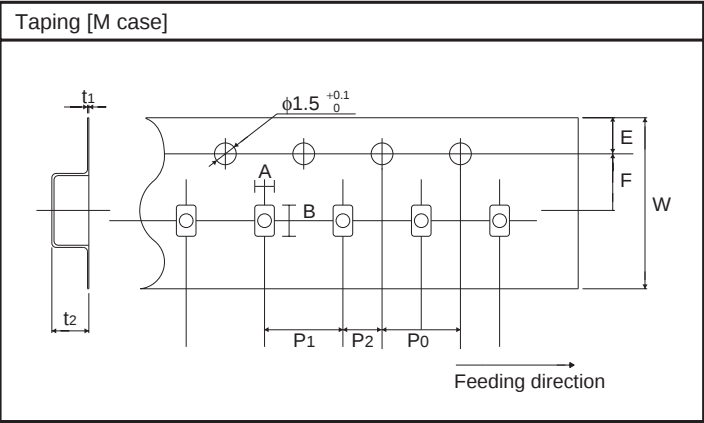
● Standard products list, TC series M case

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%)

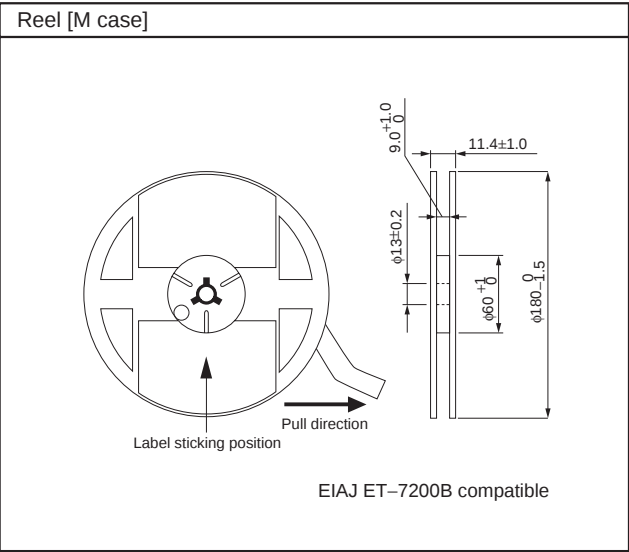
● Packaging specifications

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	ϕ 180mm Reel	R	4,000pcs



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