



Product Catalog

2009-1st



Tantalum Capacitors

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Tantalum Capacitors

Bottom Surface Electrode type (TCT series)

The underside electrode configuration allows the package to be made more compact while increasing the capacitance. This series features the largest capacity in the industry.

Fail-safe Open Structure type (TCFG series)

An open circuit mechanism is built in that shuts OFF the current if the unit overheats, ensuring greater reliability and worry-free design.

Standard Type (TC series)

This is the standard series of compact, large capacitance tantalum capacitors.

Conductive Polymer Tantalum Capacitors

Standard type (TCO series)

Conductive polymers are used in the cathode, significantly reducing ESR.

This high-performance series features excellent noise absorption in wide frequency bands.

Bottom Surface Electrode type (TCTO series)

This is a product integrating ultra-low ESR "TCO" series into a bottom-electrode structured package which is small / low-profile / large- capacitance.



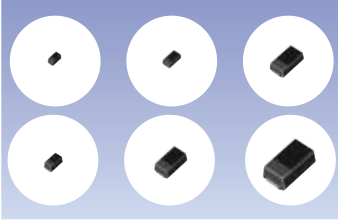
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Tantalum Capacitors

Bottom Surface Electrode type TCT series

* The TC series uses M cases exclusively.



Features

Small & Thin
High capacity
Low ESR

Summary

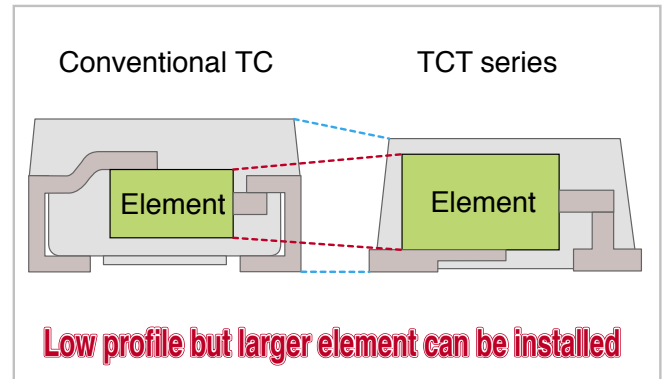
The compact terminal construction enables significantly higher capacitances than the conventional type.

Applications

Mobile phones, Digital cameras
Digital video cameras,
Portable music players and
electronic devices requiring
compactness and thinness.

Bottom surface electrode construction

The compact terminal construction allows for a larger tantalum element and, therefore, significantly higher capacitances than conventional units of the same size. As the area where the elements contacting the terminals is larger due to the structure, ESR is naturally reduced. The height is low profile such as 0.8mm for the M case, 0.9mm for the PL/AS case, 1.1mm for the AL case and 1.4mm for the CL case.



Broad lineup

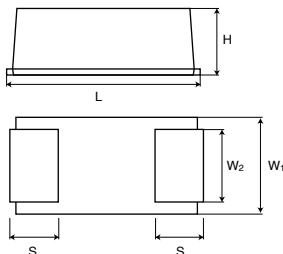
The use of the bottom surface electrode construction results in a relatively large amount of capacitance in every package size, ensuring that they are among the best in the industry.

Lineup

RED: Under development

	2.5V	4V	6.3V	10V	16V	20V	25V	35V
1.0μF			U	U M	M			PL AL
1.5μF							PL	
2.2μF			U	M	M		PL P	AL
3.3μF						PL P	P	AL
4.7μF		U M	M	M	P			AL
6.8μF					PL P			AL
10μF	U	M	M	M	PL P		AS AL	CL
15μF				PL P	AS AL			
22μF		M	M P	PL P	AS AL			
33μF		M P	PL P	P AS AL				
47μF	M		PL P AS	AS AL				
68μF		PL P	P AS AL					
100μF	PL P	PL P AS AL	AL			CL		
150μF	P	P AL	AL		CL			
220μF	P AS AL	AL		CL				
330μF			CL					
470μF		CL						

Dimensions



Case code	L	W ₁	W ₂	H	S
M(1608-09[0603])	1.6±0.1	0.85±0.1	0.55±0.1	0.8±0.1	0.5±0.1
PL(2012-10[0805])	2.0±0.2	1.25±0.2	0.85±0.2	0.9±0.1	0.5±0.1
P(2012-12[0805])	2.0±0.2	1.25±0.2	0.85±0.2	1.1±0.1	0.5±0.1
AS(3216-10[1206])	3.2±0.2	1.6±0.2	1.2±0.2	0.9±0.1	0.8±0.2
AL(3216-12[1206])	3.2±0.2	1.6±0.2	1.2±0.2	1.1±0.1	0.8±0.2
CL(6032-15[2412])	6.0±0.2	3.2±0.2	2.2±0.2	1.4±0.1	1.3±0.2

(Unit : mm)

Quick Reference

TC series M case (1608-09[0603] size)

Rated voltage V	Capacitance μF	$\tan\delta$ at 120Hz(25°C) %	Leakage current (25°C, 5min) μA	Impedance (at 100kHz) Ω	Part No.
4	4.7	20	0.5	9.0	TCM0G475□
	10	20	0.5	9.0	TCM0G106□
	22	20	0.9	9.0	TCM0G226□
	33	30	13.0	9.0	TCM0G336□
6.3	4.7	20	0.5	9.0	TCM0J475□
	10	20	0.6	9.0	TCM0J106□
10	1.0	10	0.5	15.0	TCM1A105□
	2.2	20	0.5	13.5	TCM1A225□
	4.7	20	0.5	9.0	TCM1A475□
	10	20	10.0	9.0	TCM1A106□
16	1.0	10	0.5	15.0	TCM1C105□
	2.2	20	0.5	13.5	TCM1C225□

TCT series AS case (3216-10[1206] size)

Rated voltage V	Capacitance μF	$\tan\delta$ at 120Hz(25°C) %	Leakage current (25°C, 5min) μA	Impedance (at 100kHz) Ω	Part No.
4	100	20	4.0	3.0	TCTAS0G107□
6.3	47	20	3.0	4.0	TCTAS0J476□
16	22	20	3.6	4.0	TCTAS1C226□
20	10	15	2.0	8.0	TCTAS1D106□

TCT series AL case (3216-12-[1206] size)

Rated voltage V	Capacitance μF	$\tan\delta$ at 120Hz(25°C) %	Leakage current (25°C, 5min) μA	Impedance (at 100kHz) Ω	Part No.
2.5	220	20	5.5	2.5	TCTAL0E227□
4	100	20	4.0	3.0	TCTAL0G107□
	150	20	6.0	2.7	TCTAL0G157□
	220	20	20.0	2.5	TCTAL0G227□
6.3	68	20	4.3	4.0	TCTAL0J686□
	100	18	6.3	3.0	TCTAL0J107□
10	33	15	3.3	4.0	TCTAL1A336□
	47	20	4.7	4.0	TCTAL1A476□
16	15	15	2.4	4.0	TCTAL1C156□
	22	20	3.6	4.0	TCTAL1C226□
20	10	15	2.0	8.0	TCTAL1D106□
25	4.7	15	1.2	8.0	TCTAL1E475□
	6.8	15	1.7	8.0	TCTAL1E685□
35	2.2	15	0.8	8.0	TCTAL1V225□
	3.3	15	1.2	8.0	TCTAL1V335□

TCT series P case (2012-12[0805] size)

Rated voltage V	Capacitance μF	$\tan\delta$ at 120Hz(25°C) %	Leakage current (25°C, 5min) μA	Impedance (at 100kHz) Ω	Part No.
2.5	100	30	12.5	4.0	TCTP0E107□
4	33	20	1.3	4.0	TCTP0G336□
	47	20	1.9	4.0	TCTP0G476□
	68	30	13.6	4.0	TCTP0G686□
	100	30	20.0	4.0	TCTP0G107□
6.3	22	20	1.4	5.0	TCTP0J226□
	33	20	2.1	4.0	TCTP0J336□
	47	30	14.8	4.0	TCTP0J476□
10	15	20	1.5	6.0	TCTP1A156□
	22	20	2.2	5.0	TCTP1A226□
	33	30	16.5	4.0	TCTP1A336□
16	10	20	1.6	6.0	TCTP1C106□
25	2.2	20	0.55	8.0	TCTP1E225□

TCT series CL case (6032-15[2412] size)

Rated voltage V	Capacitance μF	$\tan\delta$ at 120Hz(25°C) %	Leakage current (25°C, 5min) μA	Impedance (at 100kHz) Ω	Part No.
6.3	220	14	13.9	0.8	TCTCL0J227□
10	150	12	15	1.3	TCTCL1A157□

□=Capacitance tolerance (M:±20%)

TCT series PL case (2012-10[0805] size)

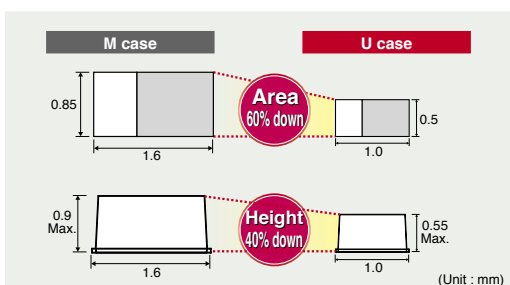
Rated voltage V	Capacitance μF	$\tan\delta$ at 120Hz(25°C) %	Leakage current (25°C, 5min) μA	Impedance (at 100kHz) Ω	Part No.
4	100	30	20.0	4.0	TCTPL0G107□
6.3	47	30	14.8	4.0	TCTPL0J476□

Further downsizing (U case:1.0×0.5mm, t=0.5mm)

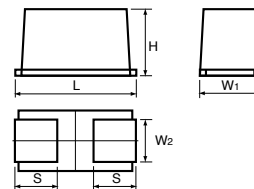
Features

- World's smallest class package (1.0×0.5mm, t=0.5mm)
- Area : 60% down, height : 40% down, compared with conventional M case (1.6×0.85mm, t=0.8mm)
- Ultra-compact package yet large capacitance of Max.10 μF
- Soundless unlike multi-layer ceramic capacitors.

Comparisons of dimensions



Dimensions



Case	L	W ₁	W ₂	H	S
U(1005)	1.0 ^{+0.2} ₋₀	0.5 ^{+0.2} ₋₀	0.35±0.1	0.55 Max.	0.35±0.1

(Unit : mm)

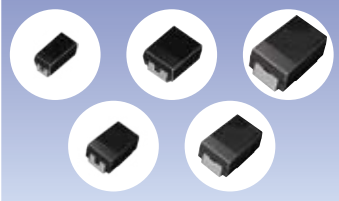
Quick Reference

TCT series U case (1005-05[0402] size)

Rated voltage V	Capacitance μF	$\tan\delta$ at 120Hz(25°C) %	Leakage current (25°C, 5min) μA	ESR (at 100kHz) Ω	Part No.
4	4.7	20	1.9	20	TCTU0G475□
6.3	1.0	20	0.7	20	TCTU0J105□
6.3	2.2	20	1.4	20	TCTU0J225□

Tantalum Capacitors

Fail-safe Open Structure type TCFG series



Features

High reliability

Summary

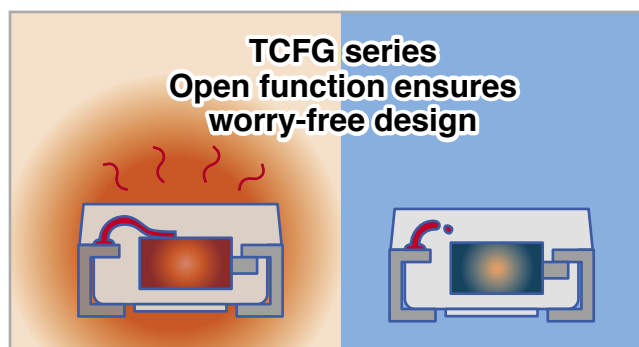
High-reliability series with built-in (open) mechanism that shuts OFF the current during overheating.

Applications

PCs, PC peripheral devices
Digital cameras
Digital video cameras
Automotive ITS-rated devices
Electronic office equipment
General electronics devices

Open mechanism built in for greater reliability

The open configuration stops current flow once the unit overheats, preventing damage to other parts of the circuit, contributing to worry-free design.



Broad lineup

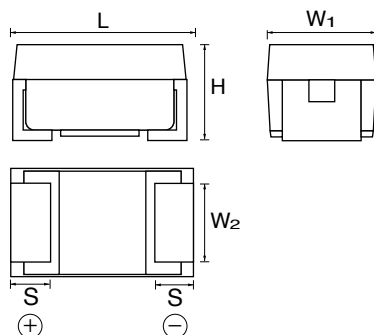
Available sizes ranging from the compact P case (2012-12[0805] size) to the oversized D case (7343-30[2917] size). The best selection in the industry allows a greater freedom of design.

Lineup

RED: Under development

	2.5V	4V	6.3V	10V	16V	20V	25V
1.0μF				P	P A	P A	P A
1.5μF			P	P A	P A	A	A
2.2μF	P		P	P A	P A	A	A
3.3μF	P		P A	P A	P A B	A B	A B
4.7μF	P A		P A	P A B	A B	A B	A B
6.8μF	P A		P A	P A B	A B	B	
10μF	P A		P A B	P A B	A B	B	
15μF	P A B		P A B	A B	B		
22μF	P A B		A B	A B	B		
33μF		A B	A B	B			
47μF		A B	A B	B			D
68μF		A B		B C			D
100μF		B		B C		D	
150μF		B	B C	B C D			
220μF	B	B C D		B D			
330μF	B	B D					

Dimensions



Case code	L	W ₁	W ₂	H	S
P(2012-12[0805])	2.0±0.2	1.25±0.2	0.9±0.2	1.1±0.1	0.45±0.3
A(3216-18[1206])	3.2±0.2	1.6±0.2	1.2±0.2	1.6±0.2	0.8±0.3
B(3528-21[1411])	3.5±0.2	2.8±0.2	1.9±0.2	1.9±0.2	0.8±0.3
C(6032-27[2412])	6.0±0.2	3.2±0.2	2.2±0.1	2.5±0.2	1.3±0.2
D(7343-30[2917])	7.3±0.2	4.3±0.2	2.4±0.1	2.8±0.2	1.3±0.2

(Unit : mm)

Quick Reference

TCFG series P case (2012-12[0805] size)

Rated voltage V	Capacitance μ F	$\tan\delta$ at 120Hz(25°C) %	Leakage current (25°C,60s) μ A	Impedance (at 100kHz) Ω	Part No.
4	2.2	10	0.5	17.5	TCFGP0G225□
	3.3	20	0.5	17.5	TCFGP0G335□
	4.7	20	0.5	14.4	TCFGP0G475□
	6.8	20	0.5	11.8	TCFGP0G685□
	10	20	0.5	9.3	TCFGP0G106□
	15	20	0.6	8.3	TCFGP0G156□
6.3	2.2	20	0.9	7.7	TCFGP0G226□
	1.5	10	0.5	17.5	TCFGP0J155□
	2.2	20	0.5	17.5	TCFGP0J225□
	3.3	20	0.5	14.4	TCFGP0J335□
	4.7	20	0.5	11.8	TCFGP0J475□
	6.8	20	0.5	9.3	TCFGP0J685□
10	10	20	0.6	8.3	TCFGP0J106□
	15	20	0.9	7.7	TCFGP0J156□
	1.0	10	0.5	17.5	TCFGP1A105□
	1.5	20	0.5	16.1	TCFGP1A155□
	2.2	20	0.5	14.4	TCFGP1A225□
	3.3	20	0.5	11.8	TCFGP1A335□
16	4.7	20	0.5	9.3	TCFGP1A475□
	6.8	20	0.7	8.3	TCFGP1A685□
	10	20	1.0	7.7	TCFGP1A106□
	1.0	10	0.5	16.1	TCFGP1C105□
	1.5	20	0.5	14.4	TCFGP1C155□
	2.2	20	0.5	11.8	TCFGP1C225□
20	3.3	20	0.6	9.3	TCFGP1C335□
	1.0	10	0.5	16.1	TCFGP1D105□
	25	1.0	10	0.5	16.1

□ = Capacitance Tolerance (M:±20% ,K:±10%)

TCFG series A case (3216-18[1206] size)

Rated voltage V	Capacitance μ F	$\tan\delta$ at 120Hz(25°C) %	Leakage current (25°C,60s) μ A	Impedance (at 100kHz) Ω	Part No.
4	4.7	6	0.5	5.6	TCFGA0G475□
	6.8	8	0.5	4.9	TCFGA0G685□
	10	8	0.5	4.2	TCFGA0G106□
	15	8	0.6	4.0	TCFGA0G156□
	22	8	0.9	3.0	TCFGA0G226□
	33	10	1.3	3.5	TCFGA0G336□
	47	12	1.9	3.2	TCFGA0G476□
	68	16	3.0	3.0	TCFGA0G686□
6.3	3.3	6	0.5	5.6	TCFGA0J335□
	4.7	8	0.5	4.9	TCFGA0J475□
	6.8	8	0.5	4.2	TCFGA0J685□
	10	8	0.6	4.0	TCFGA0J106□
	15	8	0.9	3.0	TCFGA0J156□
	22	10	1.4	3.5	TCFGA0J226□
	33	12	2.1	3.2	TCFGA0J336□
	47	18	3.0	3.2	TCFGA0J476□
10	1.5	6	0.5	8.8	TCFGA1A155□
	2.2	6	0.5	5.6	TCFGA1A225□
	3.3	8	0.5	4.9	TCFGA1A335□
	4.7	8	0.5	4.2	TCFGA1A475□
	6.8	8	0.7	4.0	TCFGA1A685□
	10	8	1.0	3.0	TCFGA1A106□
	15	10	1.5	3.5	TCFGA1A156□
	22	12	2.2	3.2	TCFGA1A226□
16	1.0	6	0.5	7.0	TCFGA1C105□
	1.5	6	0.5	5.6	TCFGA1C155□
	2.2	6	0.5	4.9	TCFGA1C225□
	3.3	6	0.5	4.8	TCFGA1C335□
	4.7	6	0.8	3.9	TCFGA1C475□
	6.8	6	1.1	3.8	TCFGA1C685□
	10	8	1.6	3.5	TCFGA1C106□
	20	1.0	6	0.5	7.0
1.5		6	0.5	6.0	TCFGA1D155□
2.2		6	0.5	5.2	TCFGA1D225□
3.3		6	0.7	4.8	TCFGA1D335□
4.7		6	0.9	3.9	TCFGA1D475□
25	1.0	6	0.5	7.0	TCFGA1E105□
	1.5	6	0.5	6.0	TCFGA1E155□
	2.2	6	0.6	5.2	TCFGA1E225□
	3.3	6	0.8	4.8	TCFGA1E335□
4.7	8	1.2	3.4	TCFGA1E475□	

□ = Capacitance Tolerance (M:±20% ,K:±10%)

TCFG series B case (3528-21[1411] size)

Rated voltage V	Capacitance μ F	$\tan\delta$ at 120Hz(25°C) %	Leakage current (25°C,60s) μ A	Impedance (at 100kHz) Ω	Part No.	
2.5	220	18	5.5	1.5	TCFGB0E227□	
	4	15	8	0.6	3.0	TCFGB0G156□
		22	8	0.9	3.0	TCFGB0G226□
		33	8	1.3	2.5	TCFGB0G336□
		47	10	1.9	2.0	TCFGB0G476□
		68	10	2.7	1.9	TCFGB0G686□
		100	12	4.0	1.6	TCFGB0G107□
		150	18	6.3	1.3	TCFGB0G157□
220	20	8.8	1.3	TCFGB0G227□		
6.3	10	8	0.6	3.0	TCFGB0J106□	
	15	8	0.9	3.0	TCFGB0J156□	
	22	8	1.4	2.5	TCFGB0J226□	
	33	8	2.1	2.0	TCFGB0J336□	
	47	10	3.0	1.9	TCFGB0J476□	
	68	12	4.3	1.6	TCFGB0J686□	
	100	12	6.3	1.6	TCFGB0J107□	
	150	18	9.5	1.5	TCFGB0J157□	
	220	30	70	1.3	TCFGB0J227□	
	10	4.7	6	0.5	3.0	TCFGB1A475□
		6.8	8	0.7	3.0	TCFGB1A685□
		10	8	1.0	3.0	TCFGB1A106□
15		8	1.5	2.5	TCFGB1A156□	
22		8	2.2	2.0	TCFGB1A226□	
33		10	3.3	1.9	TCFGB1A336□	
47		10	4.7	1.6	TCFGB1A476□	
16		3.3	6	0.5	4.2	TCFGB1C335□
		4.7	6	0.8	3.0	TCFGB1C475□
		6.8	6	1.1	3.0	TCFGB1C685□
	10	6	1.6	2.5	TCFGB1C106□	
	15	6	2.4	2.0	TCFGB1C156□	
	22	6	3.5	1.9	TCFGB1C226□	
	20	3.3	6	0.66	4.2	TCFGB1D335□
25		3.3	6	0.83	4.2	TCFGB1E335□
	4.7	6	1.2	3.0	TCFGB1E475□	

□ = Capacitance Tolerance (M:±20% ,K:±10%)

TCFG series C case (6032-27[2412] size)

Rated voltage V	Capacitance μ F	$\tan\delta$ at 120Hz(25°C) %	Leakage current (25°C,60s) μ A	Impedance (at 100kHz) Ω	Part No.
6.3	150	12	9.5	1.3	TCFCG0J157□
10	100	10	10.0	1.3	TCFCG1A107□
16	47	8	7.5	1.6	TCFCG1C476□

□ = Capacitance Tolerance (M:±20%)

TCFG series D case (7343-30[2917] size)

Rated voltage V	Capacitance μ F	$\tan\delta$ at 120Hz(25°C) %	Leakage current (25°C,60s) μ A	Impedance (at 100kHz) Ω	Part No.
6.3	220	12	13.8	0.7	TCFGD0J227□
10	150	10	15.0	0.7	TCFGD1A157□
16	100	10	16.0	0.7	TCFGD1C107□
25	47	10	11.8	0.7	TCFGD1E476□

□ = Capacitance Tolerance (M:±20%)

Tantalum Capacitors

Standard type TC series



Summary

Small

Utilizing the semiconductor manufacturing technology developed for transistors and diodes, stable quality control and superior productivity are achieved. Products are available for P case (2012-12[0805] size) and A case (3216-18[1206] size) as lineup. This is the standard series for the needs of compact size and large capacitance.

Features

Applications

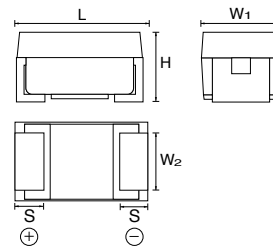
PCs, PC peripheral devices
Mobile phones
Digital cameras
Digital video cameras
General electronics devices

Lineup

RED: Under development

	4V	6.3V	10V	16V	20V	25V
1.0μF			P	P A	P A	P A
1.5μF		P	P A	P A	A	A
2.2μF	P	P	P A	P A	A	A
3.3μF	P	P A	P A	P A	A	A
4.7μF	P A	P A	P A	A	A	A
6.8μF	P A	P A	P A	A		
10μF	P A	P A	P A	A		
15μF	P A	P A	A			
22μF	P A	P A	A			
33μF	P A	A	A			
47μF	A	A	A			
68μF	A	A				
100μF	A	A				

Dimensions



Case code	L	W ₁	W ₂	H	S
P(2012-12[0805])	2.0±0.2	1.25±0.2	0.9±0.2	1.1±0.1	0.45±0.3
A(3216-18[1206])	3.2±0.2	1.6±0.2	1.2±0.2	1.6±0.2	0.8±0.3

(Unit : mm)

Quick Reference

TC series P case (2012-12[0805] size)

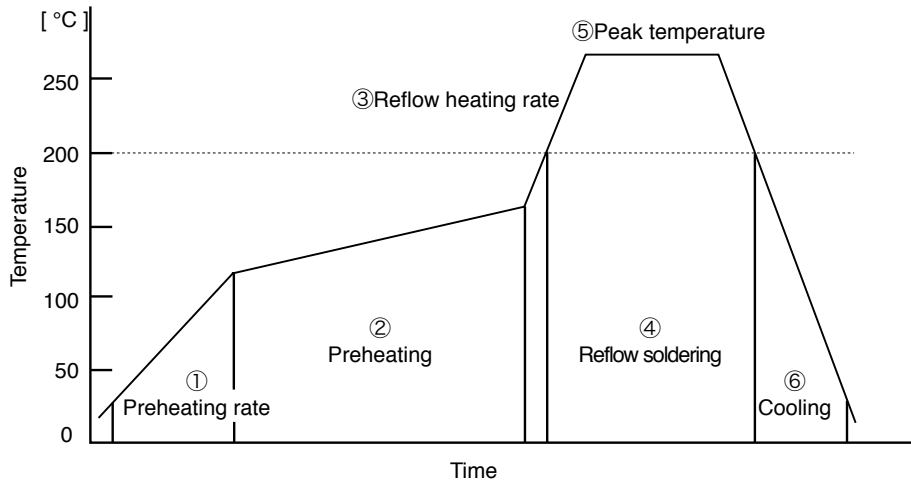
Rated voltage V	Capacitance μF	tanδ at 120Hz(25°C) %	Leakage current (25°C, 60s) μA	Impedance (at 100kHz) Ω	Part No.
4	2.2	10	0.5	17.5	TCP0G225□
	3.3	20	0.5	17.5	TCP0G335□
	4.7	20	0.5	14.4	TCP0G475□
	6.8	20	0.5	11.8	TCP0G685□
	10	20	0.5	9.3	TCP0G106□
	15	20	0.6	8.3	TCP0G156□
	22	20	0.9	7.7	TCP0G226□
6.3	1.5	10	0.5	17.5	TCP0J155□
	2.2	20	0.5	17.5	TCP0J225□
	3.3	20	0.5	14.4	TCP0J335□
	4.7	20	0.5	11.8	TCP0J475□
	6.8	20	0.5	9.3	TCP0J685□
	10	20	0.6	8.3	TCP0J106□
	15	20	0.9	7.7	TCP0J156□
10	1.0	10	0.5	17.5	TCP1A105□
	1.5	20	0.5	16.1	TCP1A155□
	2.2	20	0.5	14.4	TCP1A225□
	3.3	20	0.5	11.8	TCP1A335□
	4.7	20	0.5	9.3	TCP1A475□
	6.8	20	0.7	8.3	TCP1A685□
	10	20	1.0	7.7	TCP1A106□
16	1.0	10	0.5	16.1	TCP1C105□
20	1.0	10	0.5	16.1	TCP1D105□
25	1.0	20	0.6	9.3	TCP1E105□

□ = Capacitance tolerance (M:±20%, K:±10%)

TC series A case (3216-18[1206] size)

Rated voltage V	Capacitance μF	tanδ at 120Hz(25°C) %	Leakage current (25°C, 60s) μA	Impedance (at 100kHz) Ω	Part No.	
4	4.7	6	0.5	5.6	TCA0G475□	
	6.8	8	0.5	4.9	TCA0G685□	
	10	8	0.5	4.2	TCA0G106□	
	15	8	0.6	4.0	TCA0G156□	
	22	8	0.9	3.0	TCA0G226□	
	33	10	1.3	3.5	TCA0G336□	
	47	12	1.9	3.2	TCA0G476□	
	68	18	2.7	3.0	TCA0G686□	
	100	30	4.0	3.0	TCA0G107□	
	6.3	3.3	6	0.5	5.6	TCA0J335□
4.7		8	0.5	4.9	TCA0J475□	
6.8		8	0.5	4.2	TCA0J685□	
10		8	0.6	4.0	TCA0J106□	
15		8	0.9	3.0	TCA0J156□	
22		10	1.4	3.5	TCA0J226□	
33		12	2.1	3.2	TCA0J336□	
47		18	3.0	3.2	TCA0J476□	
10		1.5	6	0.5	8.8	TCA1A155□
		2.2	6	0.5	5.6	TCA1A225□
	3.3	8	0.5	4.9	TCA1A335□	
	4.7	8	0.5	4.2	TCA1A475□	
	6.8	8	0.7	4.0	TCA1A685□	
	10	8	1.0	3.0	TCA1A106□	
	15	10	1.5	3.5	TCA1A156□	
	22	12	2.2	3.2	TCA1A226□	
	16	1.0	6	0.5	7.0	TCA1C105□
		1.5	6	0.5	5.6	TCA1C155□
2.2		6	0.5	4.9	TCA1C225□	
3.3		6	0.5	4.8	TCA1C335□	
4.7		6	0.8	3.9	TCA1C475□	
6.8		6	1.1	3.8	TCA1C685□	
10		8	1.6	3.5	TCA1C106□	
20		1.0	6	0.5	7.0	TCA1D105□
		1.5	6	0.5	6.0	TCA1D155□
		2.2	6	0.5	5.2	TCA1D225□
	3.3	6	0.7	4.8	TCA1D335□	
	4.7	6	0.9	3.9	TCA1D475□	
25	1.0	6	0.5	7.0	TCA1E105□	
	1.5	6	0.5	6.0	TCA1E155□	
	2.2	6	0.6	5.2	TCA1E225□	
	3.3	6	0.8	4.8	TCA1E335□	
	4.7	8	1.2	3.4	TCA1E475□	

Recommended soldering conditions (TCT, TCFG, TC series)



Recommended reflow soldering conditions

- ① Preheating rate : 1 to 5°C/s
- ② Preheating : 120 to 160°C , 50 to 120s
- ③ Reflow heating rate : 1 to 5°C/s
- ④ Soldering (high temperature period) : 200°C , 30 to 60s
- ⑤ Peak temperature : 230 to 260°C , 10s Max.
- ⑥ Cooling : 60s Min.
- ⑦ Reflow count : 2 times Max.

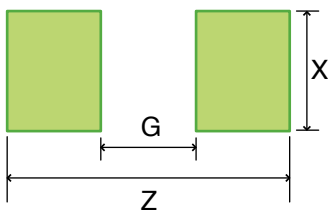
Recommended hand soldering conditions

- ① Solder tip temperature : 350°C Max. (TCFG series 300°C Max.)
- ② Time : 5 s Max.

※ TCT series is not suitable for flow soldering.

Recommended land pattern dimensions

Example of recommended land pattern

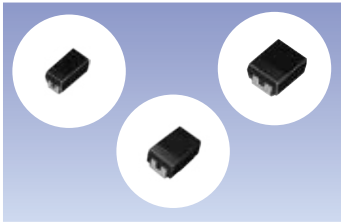


Series	Case size	X	G	Z
TCT	U	0.5	0.4	1.5
	PL	0.95	1.1	2.9
	P	0.95	1.1	2.9
	AS	1.25	1.7	4.1
	AL	1.25	1.7	4.1
	CL	2.3	3.45	8.05
TCFG	P	1.1	0.8	3.4
	A	1.4	1.2	5.2
	B	2.7	1.4	5.6
	C	2.7	2.9	6.9
	D	2.9	4.1	8.2
TC	M	0.65	0.65	2.2
	P	1.1	0.8	3.4
	A	1.4	1.2	5.2

(Unit : mm)

Conductive Polymer Tantalum Capacitors

Standard type TCO series



Features

Ultra-low ESR
Flame retardant

Summary

This series utilizes conductive polymers in the cathode for significantly reduced ESR characteristics.

Applications

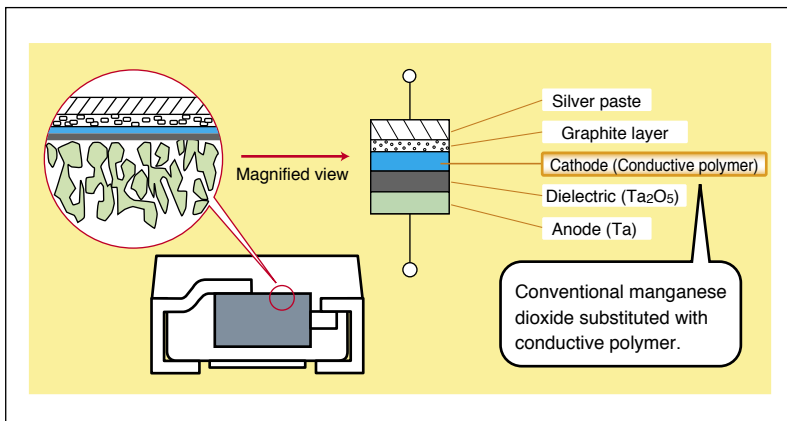
PCs, PC peripheral devices
Digital cameras
Digital video cameras
Portable music players
Automotive ITS-rated devices
General electronics devices

Ultra-low ESR

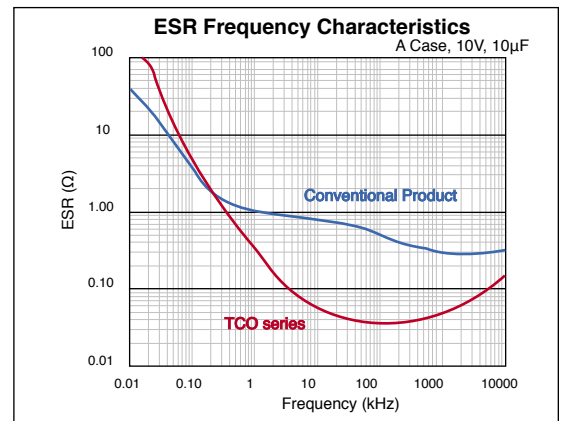
ESR has been significantly reduced due to utilization of a highly conductive cathode polymer instead of the conventional manganese dioxide, making them ideally suited for high-frequency noise absorption.

In addition the unique construction reduces the risk of smoke or fire compared with conventional products.

Internal Construction



ESR Frequency Characteristics



Broad lineup

In addition to its compact size and large capacitance, the TCO series features low ESR characteristics over a broad frequency band, making it perfect for noise absorption in high-frequency circuits.

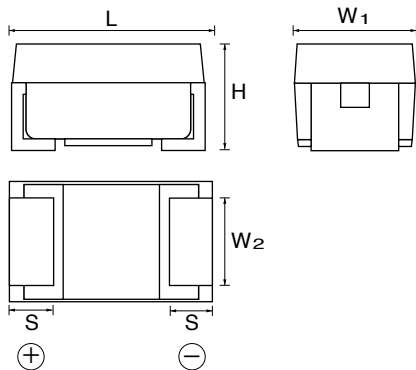
A broad lineup is offered, ensuring compatibility with a wide variety of applications, including mobile phones, lap top PCs, and other data communications devices.

Lineup

RED: Under development

	2.5V	4V	6.3V	10V
3.3µF				A
4.7µF			A	P A
6.8µF		A	A	P A
10µF	A	A	P A	A
15µF	A	P A	A	
22µF	A	A	A	
33µF	A	A		B B
47µF	A	A		B B
68µF	A			B
100µF				B
150µF		B	B	
220µF	B	B		
330µF	B			

Dimensions



Case code	L	W ₁	W ₂	H	S
P(2012-12[0805])	2.0±0.2	1.25±0.2	0.9±0.2	1.1±0.1	0.45±0.3
A(3216-18[1206])	3.2±0.2	1.6±0.2	1.2±0.2	1.6±0.2	0.8±0.3
B(3528-21[1411])	3.5±0.2	2.8±0.2	1.9±0.2	1.9±0.2	0.8±0.3

(Unit:mm)

Quick Reference

TCO series P case (2012-12[0805] size)

Rated voltage V	Capacitance μF	tanδ at 120Hz(25°C) %	Leakage current (25°C,5min) μA	ESR (at 100kHz) mΩ	Part No.
6.3	10	10	6.3	500	TCOP0J106□
10	4.7	6	4.7	500	TCOP1A475□

TCO series B case (3528-21[1411] size)

Rated voltage V	Capacitance μF	tanδ at 120Hz(25°C) %	Leakage current (25°C,5min) μA	ESR (at 100kHz) mΩ	Part No.
4	150	8	60	150	TCOB0G157□
6.3	33	8	21	150	TCOB0J336□
	47	8	30	150	TCOB0J476□
	100	8	63	150	TCOB0J107□
10	33	8	33	150	TCOB1A336□
	47	8	47	150	TCOB1A476□

TCO series A case (3216-18[1206] size)

Rated voltage V	Capacitance μF	tanδ at 120Hz(25°C) %	Leakage current (25°C,5min) μA	ESR (at 100kHz) mΩ	Part No.
2.5	10	6	3.0	200	TCOA0E106□
	15	6	3.8	200	TCOA0E156□
	22	6	5.5	200	TCOA0E226□
	33	10	8.3	200	TCOA0E336□
	47	10	11.7	200	TCOA0E476□
4	6.8	6	3.0	300	TCOA0G685□
	10	6	4.0	200	TCOA0G106□
	15	6	6.0	200	TCOA0G156□
	22	6	8.8	200	TCOA0G226□
	33	10	13.2	200	TCOA0G336□
	47	10	18.8	200	TCOA0G476□
6.3	4.7	6	3.0	300	TCOA0J475□
	6.8	6	4.3	300	TCOA0J685□
	10	6	6.3	200	TCOA0J106□
	15	6	9.5	200	TCOA0J156□
	22	6	13.9	200	TCOA0J226□
10	3.3	6	3.3	300	TCOA1A335□
	4.7	6	4.7	300	TCOA1A475□
	6.8	6	6.8	300	TCOA1A685□
	10	6	10.0	200	TCOA1A106□

□=Capacitance tolerance (M:±20%)

Conductive Polymer Tantalum Capacitors

Bottom Surface Electrode type TCTO series



Features

Small & Thin
Flame retardant
High capacity
Ultra-low ESR

Summary

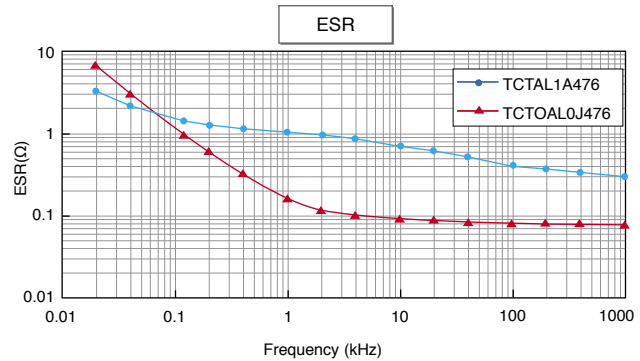
This is a high-performance product integrating ultra-low ESR conductive polymer capacitor into a bottom-electrode structured package which is small / low-profile / large-capacitance.

Applications

PCs, PC peripheral devices
Digital cameras
Digital video cameras
Car Audio
LCD TV etc.

Ultra-low ESR / Low Profile / Large Capacitance

Conductive polymer type tantalum capacitors are now encapsulated in the bottom-electrode packages with virtues of ultra-low ESR and high flame retardance inherited from market-accepted TCO series, achieving compact package size, low-profile (3.2x1.6mm, t=1.1mm) and large capacitance (Max.100μF) as well. And what more, M case(0603) and P case(0805) are on development which contribute to downsizing of application.

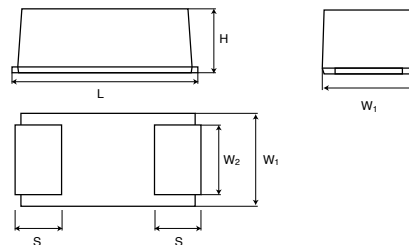


Lineup

RED:Under development

	2.5V	4V	6.3V	10V
1.0μF				
2.2μF				M
4.7μF				M
6.8μF			M	
10μF		M		P
15μF	M			P
22μF			P	AL
33μF		P		AL
47μF	P		AL	
68μF		AL		
100μF	AL			
150μF				

Dimensions



case code	L	W ₁	W ₂	H	S
M(1608-09[0603])	1.6±0.1	0.85±0.1	0.55±0.1	0.8±0.1	0.5±0.1
P(2012-12[0805])	2.0±0.2	1.25±0.2	0.85±0.2	1.1±0.1	0.5±0.1
AL(3216-12[1206])	3.2±0.2	1.6±0.2	1.2±0.2	1.1±0.1	0.8±0.2

(Unit : mm)

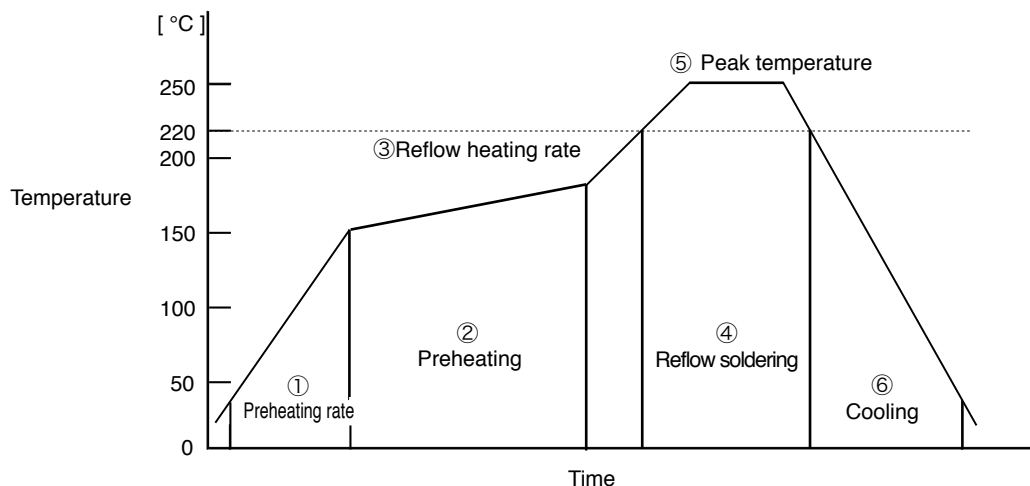
Quick Reference

TCTO series AL case (3216-12[1206] size)

Rated voltage V	Capacitance μF	tanδ at 120Hz(25°C) %	Leakage current (25°C, 5min) μA	ESR (at 100kHz) mΩ	Part No.
2.5	100	10	25.0	200	TCTOAL0E107□
4	68	10	27.2	200	TCTOAL0G686□
6.3	47	10	29.6	200	TCTOAL0J476□
10	22	6	22.0	200	TCTOAL1A226□
	33	10	33.0	200	TCTOAL1A336□

□=Capacitance tolerance (M:±20%)

Recommended soldering conditions (TCO, TCTO series)



Recommended reflow soldering conditions

- ① Preheating rate : 2°C/s
- ② Preheating : 150 to 180°C , 120s Max.
- ③ Reflow heating rate : 1.5°C/s
- ④ Soldering (high temperature period) : 220°C , 40s Max.
- ⑤ Peak temperature : 250°C , 5s Max.
- ⑥ Cooling : 60s Min.
- ⑦ Reflow count : 2 times Max.

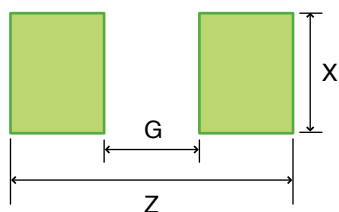
Recommended hand soldering conditions

- ① Solder tip temperature : 350°C Max.
- ② Time : 3s Max.

※ Not suitable for flow soldering

Recommended land pattern dimensions

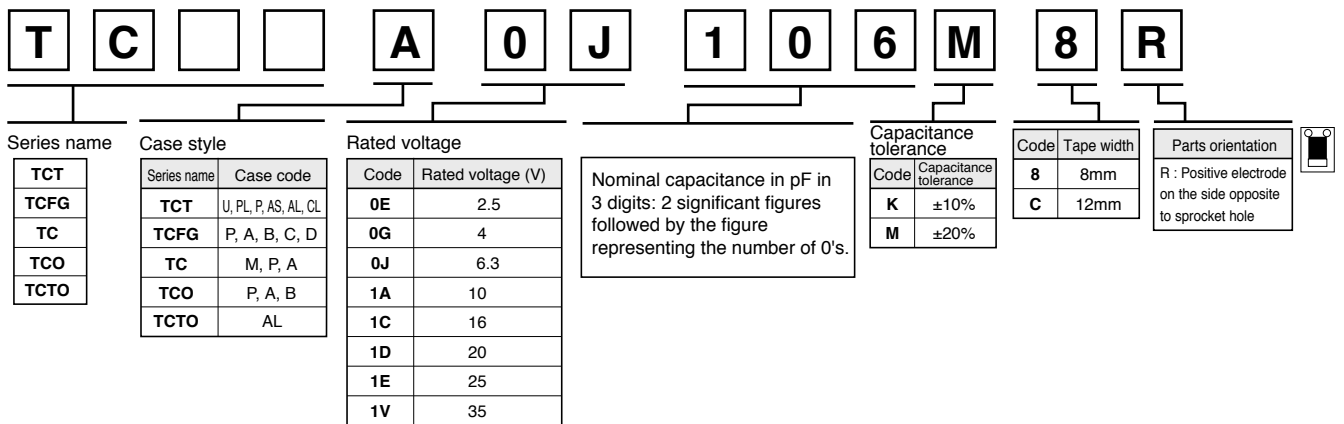
Example of recommended land pattern



Series	Case size	X	G	Z
TCO TCTO	P	1.1	0.8	3.4
	A	1.4	1.2	5.2
	B	2.7	1.4	5.6
	AL	1.25	1.7	4.1

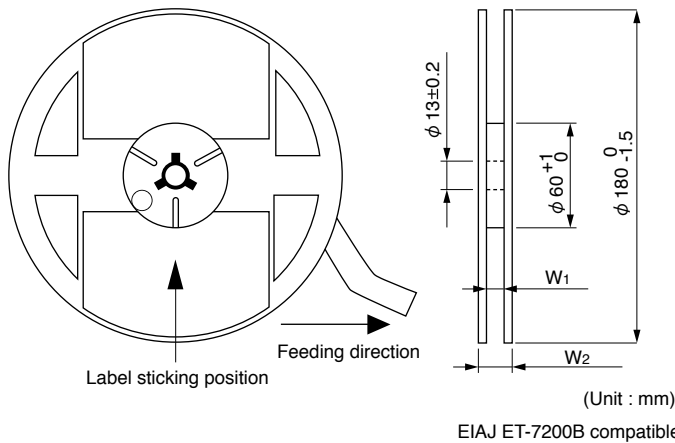
(Unit : mm)

Part Number explanation



Taping specifications

Reel for taping and packing amount



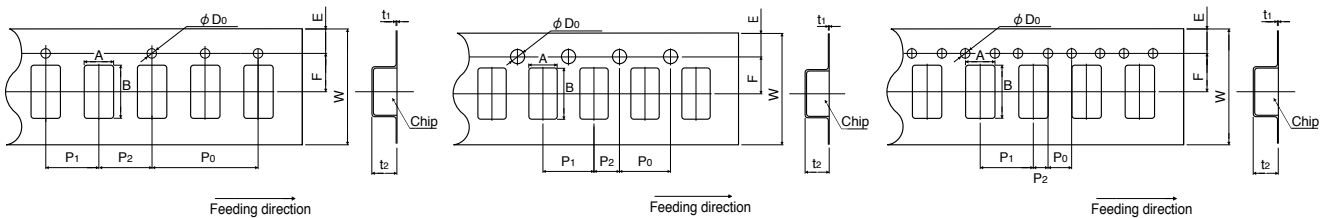
Case code	Packing amount (pcs)	Tape width ±0.3(mm)	Reel diameter ϕ (mm)	W ₁ $^{+1.0}_0$ (mm)	W ₂ ±0.1(mm)
U	10000	8.0	ϕ 180	9.0	11.4
M	4000				
PL	3000				
P					
AS					
AL	2000				
A					
B	1000	12.0		13.0	15.4
CL					
C		500		12.0	13.0
D					

Tape

U case

M, PL, P, AS, AL, A, B case

CL, C, D case



Case code	A±0.1	B±0.1	W±0.2	E±0.1	F±0.05	P ₁ ±0.1	P ₂ ±0.05	P ₀ ±0.1	D ₀ ±0.1	t ₁ ±0.05	t ₂ ±0.1
U	0.75	1.25	8.0	1.75	3.5	4.0	2.0	4.0	ϕ 1.55	0.2	0.6
M	1.0	1.85									1.0
PL	1.6	2.4									1.05
P	1.55	2.3									1.5
AS	1.9	3.5									1.1
AL	1.9	3.5	1.3								
A	1.9	3.5	1.9								
B	3.3	3.8	2.2								
CL	3.5	6.6	12.0	5.5	8.0	0.3	1.7	ϕ 1.5	0.3	3.0	
C	3.7	6.4								3.0	
D	4.8	7.7								3.0	
											3.0

(Unit : mm)

User precautions

- 1 Verification and confirmation of performance characteristics of products, after on-board mounting, is advised.
- 2 In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse) is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.

- 3 Allowable ripple voltage

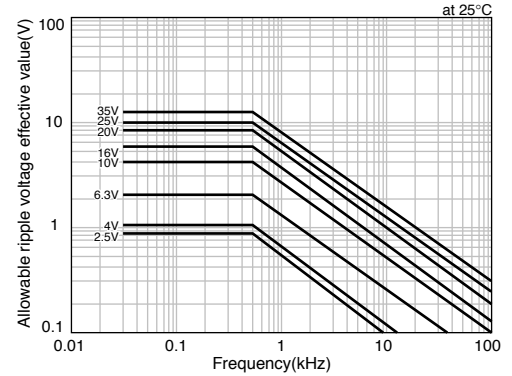
The sum of the peak values of DC and AC voltage should not exceed the rated voltage. The ripple voltage, if applied, should not exceed the maximum allowable value. The allowable ripple voltage at different temperatures should be calculated using the formulas below.

$$E = \text{Allowable ripple voltage}$$

$$E \text{ Max. (at } 50^{\circ}\text{C)} = 0.7 \times E \text{ Max. (at } 25^{\circ}\text{C)}$$

$$E \text{ Max. (at } 85^{\circ}\text{C)} = 0.5 \times E \text{ Max. (at } 25^{\circ}\text{C)}$$

$$E \text{ Max. (at } 125^{\circ}\text{C)} = 0.3 \times E \text{ Max. (at } 25^{\circ}\text{C)}$$



- 4 The voltage reduction should be as large as possible. In particular, a voltage lower than 1/3 of the rated voltage is recommended when used in low impedance circuit.
- 5 Tester must not be in contact with a capacitor. If this occurs, an excessive or reverse voltage may be applied to the capacitor.
- 6 +85 to +125°C:with voltage derating.
- 7 Apply a series-resistor rated at 3W per 1V.
- 8 When a highly active halogenous (chlorine, bromine, etc.) flux is used, the remainder of flux may negatively affect product performance and reliability. Use flux with no halogens.
- 9 In principle, reflow soldering method must be used; if flow soldering method is preferred, please consult with the Company in advance.
In case of ultrasonic cleaning, please consult with the Company.

For basic guidelines on using chip tantalum capacitors, see the technical reports issued by Japan Electronic and Information Technology Industries Association.

[JEITA RCR-2368B :Guideline of notability for fixed tantalum electrolytic capacitors with solid electrolyte for use in electronic equipment (Safety Application Guide for fixed tantalum electrolytic capacitors with solid electrolyte for use in electronic equipment)]

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