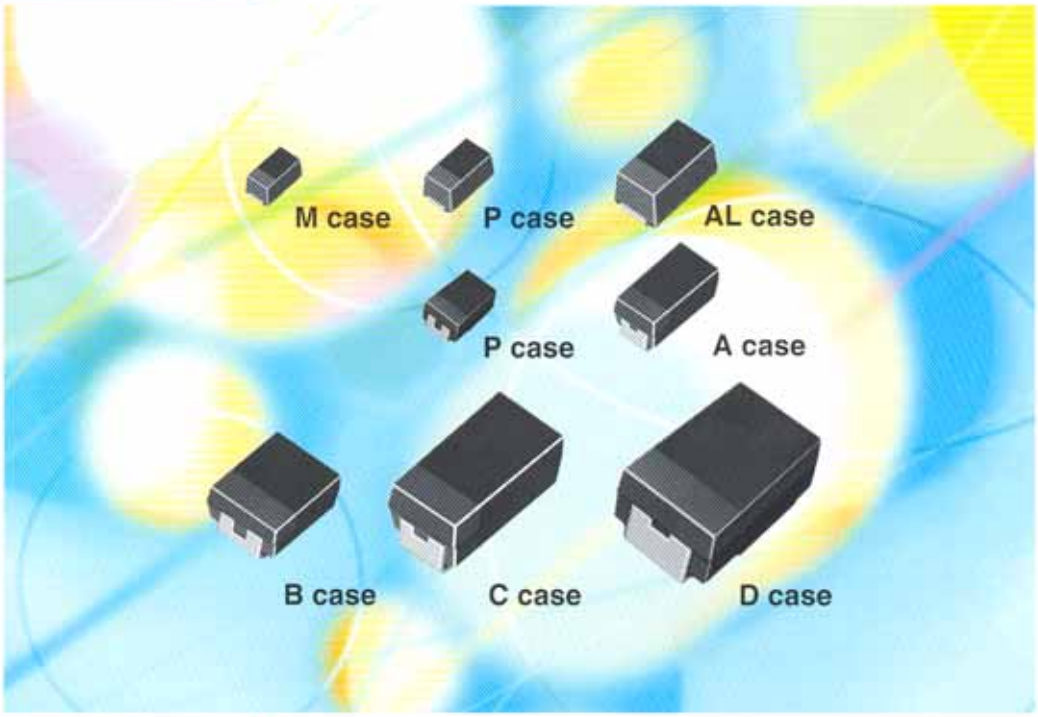
Excellence in Electronics

ROHM

Tc - Tantalum Caps.

2005
Ver.1

Tantalum Capacitors



CONTENTS

TC Series P case / A case
- Standard Type

TC Series M case
TCT Series P case / AL case
- Face-down Terminal Type

TCFG Series P case / A case / B case
C case / D case
- Open Function Built-in Type

TCO Series A case
- Conductive Polymer Type

ROHM CO., LTD.

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Selection Guide

1 Standard Type — Conventional Line-up

TC Series	P case (2012)
TC Series	A case (3216)

Apprications

- General electric equipment
- Mobile phone

2 Face-down Terminal Type — Large capacitance in small case · Low ESR

Only M case is supplied as TC Series.

TC Series	M case (1608)
TCT Series	P case (2012)
TCT Series	AL case (3216L) t=1.2mm

Apprications

- Mobile phone
- DSC
- DVC
- Applications require small and low-profile capacitors

3 Open Function Built-in Type — For safety requirement

TCFG Series	P case (2012)
TCFG Series	A case (3216)
TCFG Series	B case (3528)
TCFG Series	C case (6032)
TCFG Series	D case (7343)

Apprications

- PC and PC peripheral equipment
- VCR, DSC
- ITS applications for automative
- General Bussines Machine (Printer, Facsimile, copy)

4 Conductive Polyer Type — Ultra low ESR

TCO Series	A case

Apprications

- PC and PC peripheral equipment
- Mobile phone
- DSC
- DVC

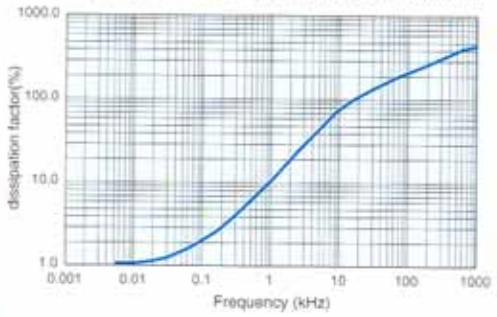
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[Typ.] TC Series P case (6.3V, 10μF)

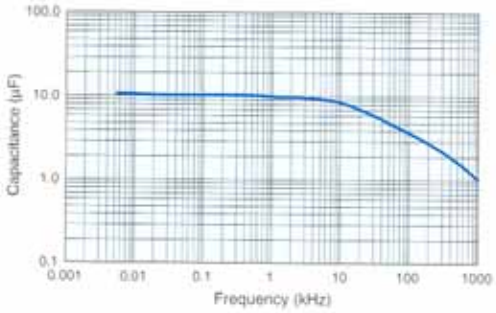
1 Frequency characteristics

The electric characteristics of tantalum capacitors response to the frequency of the circuits.
Generally, capacitance and dissipation factor are measured at 120Hz, impedance and ESR are measured at 100kHz.
Please consider with the frequency characteristic curves when you start to design.

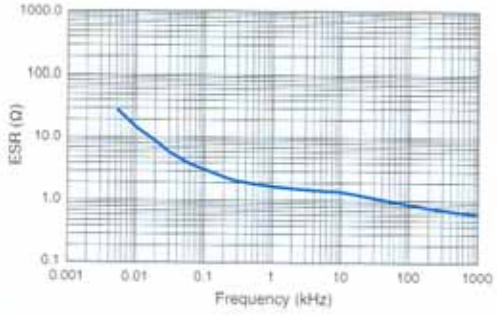
Frequency characteristics : dissipation factor



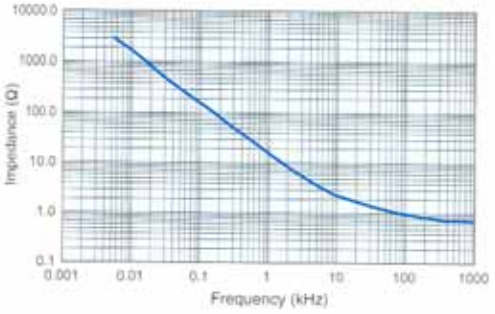
Frequency characteristics : Capacitance



Frequency characteristics : ESR



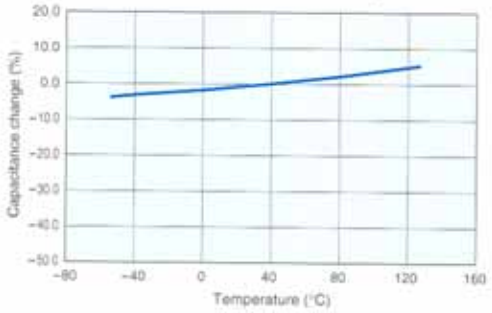
Frequency characteristics : Impedance



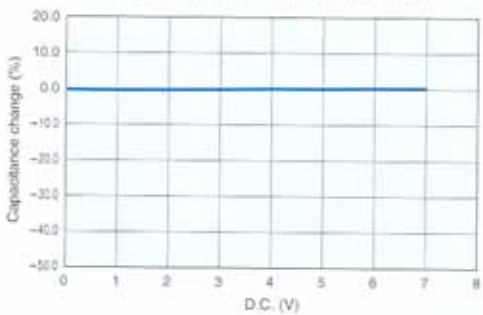
2 Temperature characteristics and DC bias characteristics

Capacitance value of tantalum capacitor is stable for the ambient temperature, and it is stable for DC bias of the circuits.

Temperature characteristics : Capacitace



DC Bias characteristics : Capacitace



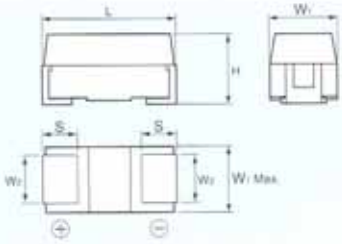
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TC Series P case/A case (2012·3216)

Features

1) Vital for all hybrid integrated circuits board application.
2) Wide capacitance range.
3) Screening by thermal shock.

Dimensions

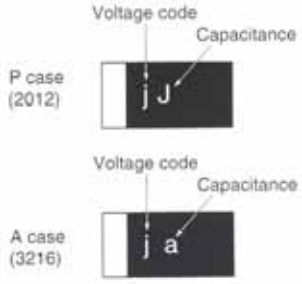


Case code	L	W1	W2	H	S
P(2012)	2.0±0.2	1.25±0.2	0.9±0.2	Max.1.20	0.45±0.3
A(3216)	3.2±0.2	1.6±0.2	1.2±0.2	1.6±0.2	0.8±0.3

(Unit:mm)

Rated Table·Marking

μF	Rated voltage (V. DC)						
	4 0G	6.3 0J	10 1A	16 1C	20 1D	25 1E	35 1V
1.0			P	P, A	P, A	P, A	A
1.5		P	P, A	P, A	A	A	
2.2	P	P	P, A	P, A	A	A	
3.3	P	P, A	P, A	P, A	A	A	
4.7	P, A	P, A	P, A	A	A		
6.8	P, A	P, A	P, A	A			
10	P, A	P, A	P, A	A			
15	P, A	P, A	A				
22	P, A	P, A	A				
33	A	A					
47	A	A					
68	A						
100	A						



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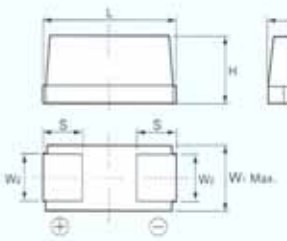
TC Series M case, TCT Series P case/AL case (1608·2012·3216L)

Features

Newly designed ROHM original package strucure (face-down terminal)provides,

1) Achieve the double capacitance value as compare with the current product.
2) Excellent adhesion.
3) Easy visual recognition of fillets.

Dimensions

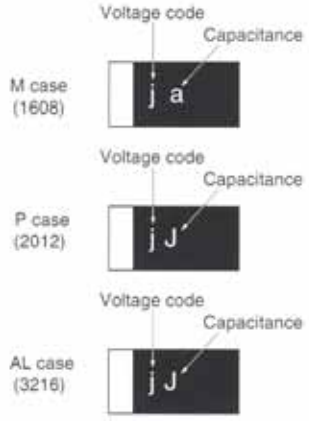


Case code	L	W1	W2	H	S
M(1608)	1.6±0.1	0.85±0.1	0.55±0.1	0.8±0.1	0.5±0.1
P(2012)	2.0±0.2	1.25±0.2	0.85±0.2	Max.1.20	0.5±0.1
AL(3216)	3.2±0.2	1.6±0.2	1.2±0.2	1.1±0.1	0.8±0.2

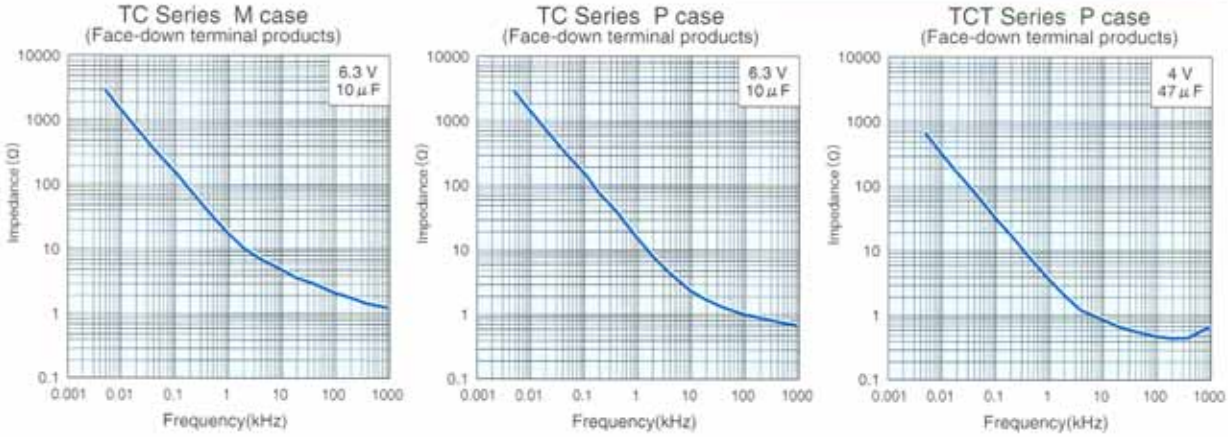
(Unit:mm)

Rated Table·Marking

µF	Rated voltage (V. DC)				
	4 0G	6.3 0J	10 1A	16 1C	20 1D
1			M	M	
1.5					
2.2			M		
3.3					
4.7		M	M		AL
6.8		M			
10	M	M			
15			P	AL	
22	M	P	P		
33	P	P	AL		
47	P	AL	AL		
68	AL	AL			
100	AL				



Impedance characteristics



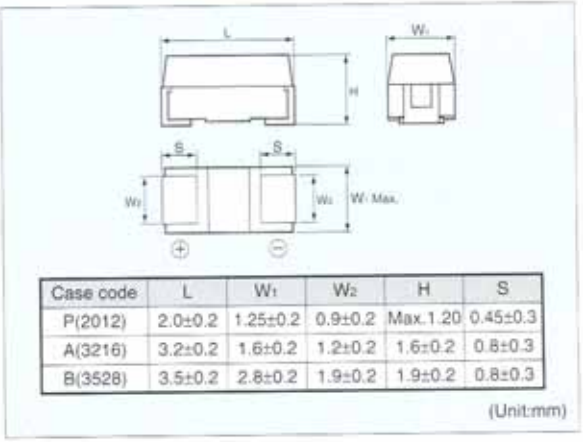
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TCFG Series P case/A case/B case (2012·3216·3528)

Features

1) Safety design by open function built-in
2) Wide capacitance range
3) Screening by thermal shock

Dimensions

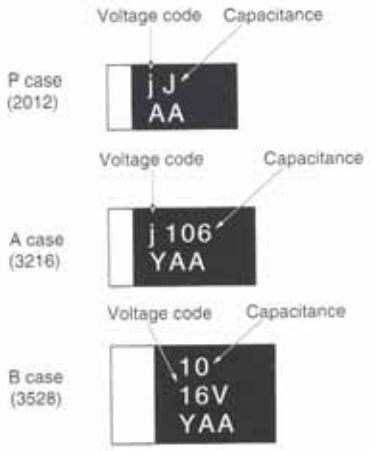


Case code	L	W1	W2	H	S
P(2012)	2.0±0.2	1.25±0.2	0.9±0.2	Max.1.20	0.45±0.3
A(3216)	3.2±0.2	1.6±0.2	1.2±0.2	1.6±0.2	0.8±0.3
B(3528)	3.5±0.2	2.8±0.2	1.9±0.2	1.9±0.2	0.8±0.3

(Unit:mm)

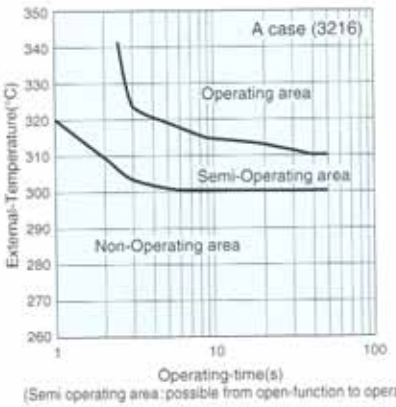
Rated Table·Marking

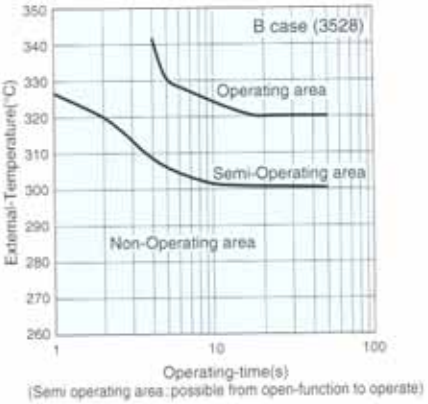
μF	Rated voltage (V. DC)						
	2.5 0E	4 0G	6.3 0J	10 1A	16 1C	20 1D	25 1E
1.0				P	P, A	P, A	A
1.5			P	P, A	P, A		
2.2		P	P	P, A	P, A		
3.3		P	P, A	P, A	P, A, B	B	B
4.7		P, A	P, A	P, A, B	A, B	B	
6.8		P, A	P, A	A, B	A, B	B	
10		P, A	P, A, B	A, B	A	B	
15		P, A, B	P, A, B	A, B	B		
22		P, A, B	A, B	A, B	B		
33		A, B	A, B	B			
47		A, B	A, B	B			
68		A, B	B	B			
100		B	B				
150		B					
220	B	B					



Open-function characteristic by temperature







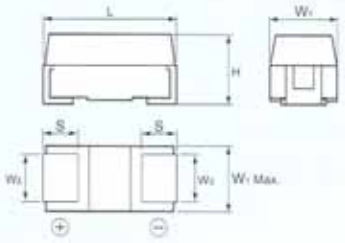
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TCFG Series C case/D case (6032·7347) NEW

Features

1) Safety design by open function built-in
2) Wide capacitance range
3) Screening by thermal shock

Dimensions

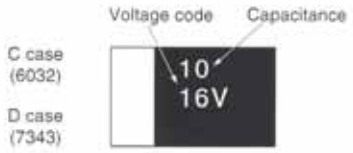


Case code	L	W_1	W_2	H	S
C(6032)	6.0±0.2	3.2±0.2	2.2±0.1	2.5±0.2	1.3±0.2
D(7343)	7.3±0.2	4.3±0.2	2.4±0.1	2.8±0.2	1.3±0.2

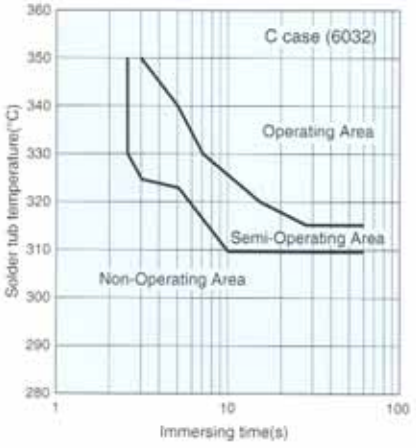
(Unit:mm)

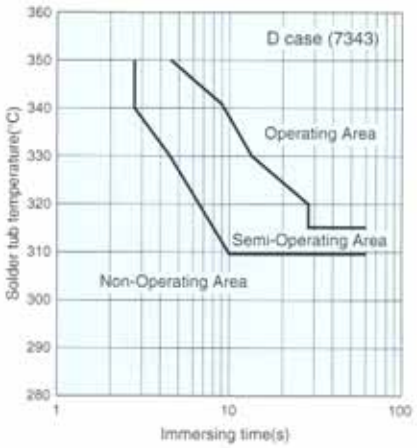
Rated Table·Marking

μF	Rated voltage (V. DC)			
	4 0G	6.3 0J	10 1A	16 1C
22				
33				C
47				C
68			C	D
100		C	C, D	D
150	C	C, D	D	
220	C, D	D		
330	D			
470				
680				



Open-function characteristic by temperature





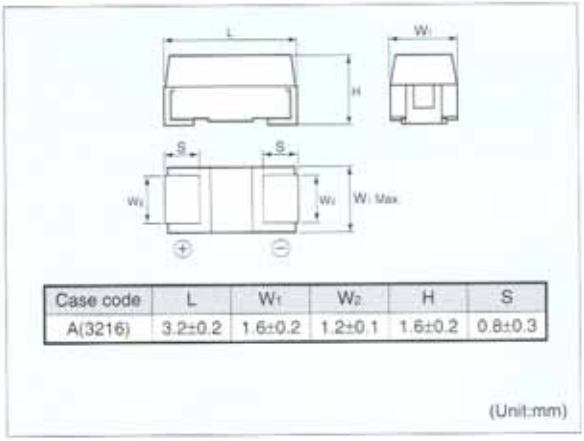
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TCO Series A case (3216·Low ESR) NEW

Features

1) The cathode material is conductive polymer
2) Ultra low ESR
   (1/10 : compare with the conventional product)
3) Screening by thermal shock

Dimensions

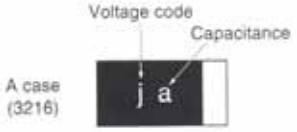


Case code	L	W1	W2	H	S
A(3216)	3.2±0.2	1.6±0.2	1.2±0.1	1.6±0.2	0.8±0.3

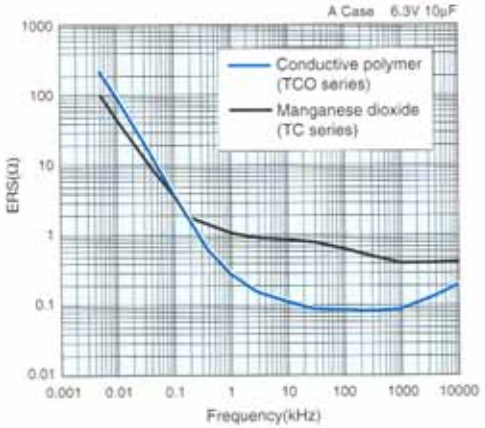
(Unit:mm)

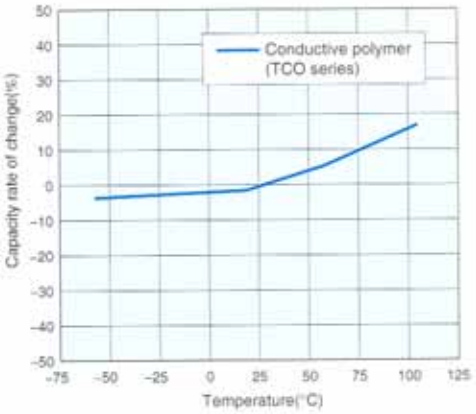
Rated Table·Marking

μF	Rated voltage (V. DC)			
	2.5 0E	4 0G	6.3 0J	10 1A
3.3				
4.7				A
6.8			A	A
10		A	A	A
15	A	A	A	
22	A	A	A	
33	A	A		
47	A			
68				



Electrical characteristics data



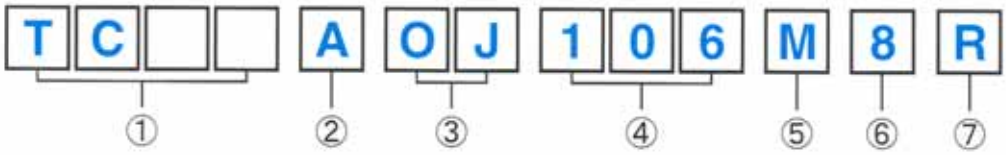


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Specification

	TC/TCT/TCFG Series	TCO Series
Operating Temperature Range	−55°C through + 125°C Operation (125°C with voltage derating)	−55°C through + 105°C Operation (105°C with voltage derating)
Capacitance Tolerance	±20%(M) , ±10%(K)	±20%(M)
Dissipation Factor	Refer to the individual spec.	Refer to the individual spec.
Leakage Current	0.5μA(25°C 1min) or 0.01CV whichever is greater	5μA(25°C 5min) or 0.1CV whichever is greater
Temperature Cycle	−55°C to + 125°C 5cycle	−55°C to + 105°C 5cycle
Resistance to Soldering Heat	260°C 5s dipped	240°C 10s dipped
Surge Voltage	As follows JIS spec.	As follows JIS spec.

Model name configuration



①Series name

TC/TCT/TCFG/TCO

②Case code

TC ·····M , P , A
TCT ·····P , AL
TCFG ·····P , A , B , C , D
TCO ·····A

③Rated voltage

Rataed voltage(V)	2.5	4	6.3	10	16	20	25
CODE	0E	0G	0J	1A	1C	1D	1E

④Capacitance

pF Code : 1st two digits represent significant figures, 3rd digit represent multiplier (number of zeros to follow)
$155 = 15\times10^{5}pF = 1.5\times10^{6}pF = 1.5\mu F$

⑤Capacitance Tolerance

M : ±20% K : ±10%

⑥Tape Width

8 : Tape width (8mm) M , P , A , AL , B
C : Tape width (12mm) C , D

⑦Taping Direction

R : Anode is on the opposite side of the sproket hole

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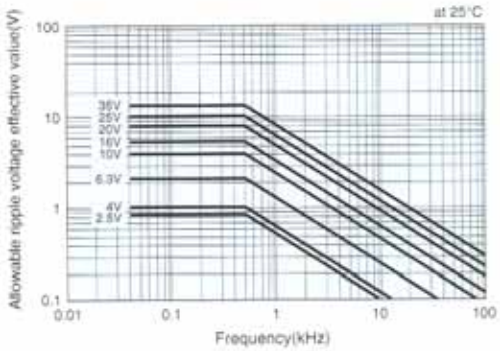
Precautions

1. Verifications and confirmation of performance characteristics of products, after on-board mounting, is advised.

2. In particular, if a transient load (a lage amount of load applied in a short period of time, such as pulse) is applied, confirmation of performance characteristics after on-bord 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 the values in the figure below. However, the allowable ripple voltage at a high temperature should be calculated using the equation below.

   E=Allowable ripple voltage
   E Max. (at 50°C)=0.7 x E Max. (at 25°C)
   E Max. (at 85°C)=0.5 x E Max. (at 25°C)
   E Max. (at 125°C)=0.7 x E Max. (at 25°C)



4. The voltage reduction sholud be as large as possible.
   Especially, a voltage lower than 1/3 of the rated voltage is recommended when used in low impedance circuit.

5. Tester must not be contacted with a capacitor. If it is done, an excessive or reverse voltage may be applied to the capacitor.

6. +85 to +125°C:with voltage derating.

7. Apply the series-resistor 3Ω per 1V.

8. When a highly active halogenous (chlorine, bromine, etc.) flux is used, the remainder of flux may negatively affect product performance and reliabilty. Use the flux with no halgenous.

9. In principle, the reflow soldering method must be used; if flow soldering method is preferred, please consult with the Company in advance.
   And in case of ultrasonic cleaning, please consult with the Company.

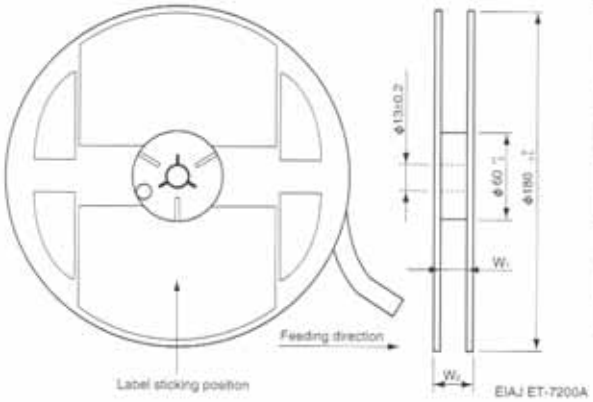
For basic guidelines on using chip tantalum capacitars, see the technical reports issued by Japan Electronic and Information Technology Industries Association.

[JEITA RCR-2368B :Guideline of notabilia 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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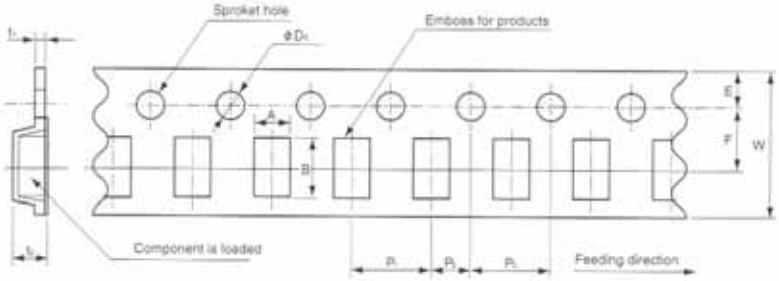
Packaging Specifications

Taping Reel and Packaging Quantity



Case size	Quantity (pcs)	Tape width ±0.3(mm)	Reel φ $^{0}_{-1.5}$ (mm)	W_1 $^{+1.0}_{0}$ (mm)	W_2 ±1.0 (mm)
M	4000	8.0	φ180	9.0	11.4
P	3000				
AL					
A	2000				
B					
C	500	12.0		13.0	15.4
D					

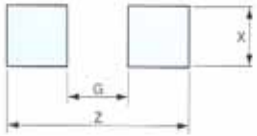
Embossed Carrier Tape



(Unit:mm)

Case size	A±0.2	B±0.2	W±0.3	E±0.1	F±0.1	P_1±0.1	P_2±0.1	P_0±0.1	D_0±0.1	t_1±0.1	t_2±0.2
M	1.0	1.85	8.0	1.75	3.5	4.0	2.0	4.0	φ1.5	0.20	1.0
P	1.55	2.3								0.25	1.5
AL	1.9	3.5									1.3
A											1.9
B	3.3	3.8									2.2
C	3.7	6.4	12.0		5.5	8.0				0.30	3.0
D	4.8	7.7									3.3

Design example of Land patten



(Unit:mm)

Series	Case size	X	G	Z
TC TCFG TCO	M	0.65	0.65	2.2
	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
TCT	P	0.95	1.1	2.9
	AL	1.25	1.7	4.1

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ROHM CO., LTD.
21, Saiin Mizosaki-cho, Ukyo-ku, Kyoto
615-8585, Japan
TEL: (075)311-2121 FAX: (075)315-0172
URL http: // www. rohm. com

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