

## Electronic Components

# HIGH QUALITY CAPACITORS



## Certifications of Quality Management System (as of Jun. 2007)

Factory	Applicable Standard	Certification Number	Item	Applicable Organization
ELNA CO., LTD. SHIRAKAWA Tech. (Japan)	ISO 9001	SGS/J/Q 1327	Aluminum electrolytic capacitors Electric double layer capacitors	SGS
ELNA TOHOKU CO., LTD. AOMORI Factory (Japan)				
TANIN ELNA CO., LTD. (Thailand)	ISO/TS 16949	44 111 060686	Aluminum electrolytic capacitors	TÜV
	ISO 9001	0410 1999 0506 E5	Aluminum electrolytic capacitors	TÜV
ELNA-SONIC SDN. BHD. (Malaysia)	ISO/TS 16949	IATF 0038084 MY04/0675T2	Aluminum electrolytic capacitors	SGS
	ISO 9001	SG02/20012	Aluminum electrolytic capacitors	SGS
ELNA-LELON ELECTRONICS (SUZHOU) CO., LTD. (China)	ISO 9001	FM68865	Tantalum chip capacitor	BSi

## Certifications of Environmental Management System (as of Jun. 2007)

Factory	Applicable Standard	Certification Number	Applicable Organization
ELNA TOHOKU CO., LTD. AOMORI Factory (Japan)	ISO 14001	JQA-EM2918	Japan Quality Assurance (JQA)
TANIN ELNA CO., LTD. (Thailand)	ISO 14001	04104 1999 0506E5	TÜV
ELNA-SONIC SDN. BHD. (Malaysia)	ISO 14001	SG03/60718	SGS
ELNA-LELON ELECTRO- NICS (SUZHOU) CO., LTD. (China)	ISO 14001	GB03/59853	SGS

### Please read the following warning and cautions !!

The Electronic components shown in this catalog are designed and produced mainly for such general purpose electronic equipment as audio and visual equipment, home appliances, office equipment and information processing and communication equipment.

If you wish to use these components in medical equipment, transportation equipment, (automotive, train, ships, etc), aircraft, spacecraft, security systems or other equipment that requires high security application, you are required to confirm application through your own testing and own judgment.

Regardless of a component intended use, if high safety application is required, it is recommended that you shall establish a protective or redundant circuit and shall conduct own evaluation test.

It is highly recommended that you shall follow our "Cautions for using"

Also it is recommended that you shall obtain technical specifications from Elna Co., Ltd to ensure that the component is suitable for your intended use.

It is not our responsibility for any kind of problems without technical specifications.

Specifications and dimensions shown in this catalog are subject to change without prior notice.

■ **“GREEN CAP”**

“GREEN CAP”, ELNA considers the global environment and it is a product that doesn't use the hazardous substance and “Lead Free” in the plating of terminals and outer Sleeves.

The product in this catalog is ‘GREEN CAP’ if there is no description in the text.

The hazardous substance is

- Pb: lead, Cr<sup>6+</sup> : hexavalent chromium, Hg: mercury and Cd: cadmium,
- PBB: the polybrominated biphenyl, PBDE: the polybromo-diphenyl ether,
- PVC: Polyvinyl chloride

This product doesn't use the ozone-layer-depleting substance provided by the Montreal Protocol, in the production process of the material used and the production process of the products.

■ **Lineup of “GREEN CAP”**

● **Aluminum electrolytic capacitors**

Category		GREEN CAP	Notes
SMD (Chip type)	General type	PVX, PVM, PVH RV, RV2, RV3, RV4, RV5, RVB, RVS, RVL, RVJ, RVH, RVC, RVD, RVZ, RVK, RTJ, RTH, RTK, RYK	We can respond in all series.
	For audio type	PVO RVO, RVW	We can respond in all series. For audio capacitors, sound quality may be changed after changing to the “GREEN CAP”. Please contact us for details.
Small type	General type	RC3, R3S, RB3, RC2, R2S, RB2, RE3, R2B, RJ5, RJ4, RJ3, RJJ, RJH, RJB, RJF, RJL, RK, RLB	We can respond in all series.
	For audio type	RFS, ROS, ROA, ROB, R2O, R2A, R3A, RFO, RA2, RA3, RBD	We can respond in all series. For audio capacitors, sound quality may be changed after changing to the “GREEN CAP”. Please contact us for details.
Large Capacitance type	General type	LA5, LAG, LAH, LAT, LUH, LAX	We can respond in all series.
	For audio type	LAO	We can respond in all series. For audio capacitors, sound quality may be changed after changing to the “GREEN CAP”. Please contact us for details.

● **Tantalum chip capacitors**

Category	GREEN CAP	Notes
SMD (Chip type)	SY1, SY2, SY3, SY4, SY5, SY6, SY7, SY8, SY9, SYF, SYL	We can respond in all series.

● **Electric double layer capacitors**

Category	GREEN CAP	Notes
SMD (Coin type)	DS, DSK	We can respond in all series.
Lead type	DB, DBN, DBJ, DX, DXJ, DK, DH, DC, DCK, DZ, DZN, DP	We can respond in all series.
Screw terminal type	DP	We can respond in all series.

**Terminal area plating material and sleeve material**

**● Aluminum electrolytic capacitors**

Category		Terminal area plating	Sleeve
SMD (Chip type)	General type	Sn-Bi  (However, Following items : Sn 100% ) It applies to large Type of RV, RVJ, and RVK RYK A supplementary terminal of RTJ, RTH, RTK, and RYK	PET (Apply to the size of ø8x10 or more. )
	For audio type	Sn-Bi	PET (Apply to the size of ø8x10 or more. )
Small type	General type	Sn 100%	PET
	For audio type	Sn 100%	PET
Large Capacitance type	General type	Sn 100%	PET
	For audio type	Sn 100%	PET

**● Tantalum chip capacitors**

Category	Terminal area plating	Sleeve
SMD (Chip type)	Sn 100%	_____

**● Electric double layer capacitors**

Category	Terminal area plating	Sleeve
SMD (Coin type)	Sn 100%	_____
Lead type	Sn 100%	PET (However,N/A for DC and DCK)
Screw terminal type	_____	PET

Note : Sn : Tin Bi : Bismuth

Please inquire when hoping excluding the above-mentioned terminal plating and sleeve.

**Terminal area plating material and sleeve material****● Aluminum electrolytic capacitors**

Category		Terminal area plating	Sleeve
SMD (Chip type)	General type	Sn-Bi  (However, Following items : Sn 100% ) It applies to large Type of RV, RVJ, and RVK RYK A supplementary terminal of RTJ, RTH, RTK, and RYK	PET (Apply to the size of ø8x10 or more. )
	For audio type	Sn-Bi	PET (Apply to the size of ø8x10 or more. )
Small type	General type	Sn 100%	PET
	For audio type	Sn 100%	PET
Large Capacitance type	General type	Sn 100%	PET
	For audio type	Sn 100%	PET

**● Tantalum chip capacitors**

Category	Terminal area plating	Sleeve
SMD (Chip type)	Sn 100%	_____

**● Electric double layer capacitors**

Category	Terminal area plating	Sleeve
SMD (Coin type)	Sn 100%	_____
Lead type	Sn 100%	PET (However,N/A for DC and DCK)
Screw terminal type	_____	PET

Note : Sn : Tin Bi : Bismuth

Please inquire when hoping excluding the above-mentioned terminal plating and sleeve.

Be sure to read “Cautions for Using Electrolytic Capacitors”, before using those products.

<b>1</b>	<b>Aluminum Electrolytic Capacitors</b>	— 5	
	<b>Aluminum Electrolytic Capacitors With Conductive Polymer Solid Electrolyte</b>	— 15	Aluminum Electrolytic Capacitors With Conductive Polymer Solid Electrolyte
	<b>Chip Type, Miniature and Large Capacitance Aluminum Electrolytic Capacitors</b>	— 27	Chip Type, Miniature and Large Capacitance Aluminum Electrolytic Capacitors
	<b>Aluminum Electrolytic Capacitors for Audio</b>	— 97	Aluminum Electrolytic Capacitors for Audio
<b>2</b>	<b>Tantalum Chip Capacitors</b>	— 123	Tantalum Chip Capacitors
<b>3</b>	<b>Electric Double Layer Capacitors “DYNACAP”</b>	— 143	Electric Double Layer Capacitors



## Ordering Information

Please designate the number of capacitors you order in integral multiples of the minimum packing number of units.

### Aluminum Electrolytic Capacitors

Classification	Size ø D x L(mm)	Quantity (PCS.)							
		Long lead		Forming lead		Taping (flat box)		Taping (reel)	
		Quantity per vinyl bag	Packaging box	Quantity per vinyl bag	Packaging box	Quantity per box	Packaging quantity	One reel quantity	Packaging quantity
Chip Type	ø3, ø4	—	—	—	—	—	—	2,000	10,000
	ø5 to ø8x6.7, ø6.3x7.7	—	—	—	—	—	—	1,000	5,000
	ø8x10, ø10x7.7 to 10.5	—	—	—	—	—	—	500	2,000
	ø12.5x13.5	—	—	—	—	—	—	200	1,000
	ø12.5x17.5	—	—	—	—	—	—	150	750
	9.5x19 to 24	—	—	—	—	—	—	400	(2,000)
04 Type	ø3x5	200	4,000	200	5,000	2,000	20,000	—	—
	ø4 to ø5x5, ø4x7	200	2,000	200	5,000	2,000	20,000	—	—
	ø6.3x5, ø5x7	200	2,000	200	4,000	2,000	20,000	—	—
	ø6.3x7	200	2,000	200	2,000	2,000	20,000	—	—
	ø8x5 to 7	200	2,000	200	2,000	1,000	10,000	—	—
	ø5 to 6.3x11, 11.5	200	2,000	200	2,000	2,000	20,000	—	—
	ø8x11.5, 12	200	1,000	200	2,000	1,000	10,000	—	—
	ø8x15	200	1,000	200	2,000	1,000	8,000	—	—
	ø8x20	200	1,000	200	1,000	1,000	8,000	—	—
	ø10x12.5	200	1,000	200	2,000	500	5,000	—	—
	ø10x16	200	1,000	200	1,000	500	5,000	—	—
	ø10x20	200	1,000	200	1,000	500	4,000	—	—
	ø10x25 to 30	200	1,000	200	1,000	500	3,000	—	—
	ø12.5x15	200	1,000	200	1,000	500	4,000	—	—
	ø12.5x20 to 25	100	1,000	100	500	500	4,000	—	—
	ø12.5x30 to 35	100	500	100	500	500	3,000	—	—
	ø12.5x40	100	500	100	500	—	—	—	—
	ø16x16	100	500	100	500	250	2,000	—	—
	ø16x20	100	500	100	400	250	2,000	—	—
	ø16x25	100	500	100	1,000	250	1,500	—	—
	ø16x31.5	50	500	100	1,000	250	1,500	—	—
ø16x35.5	50	400	100	1,000	250	1,500	—	—	
ø16x40	50	400	100	1,000	—	—	—	—	
ø18x16 to 20	100	500	100	1,000	250	1,500	—	—	
ø18x25 to 31.5	50	400	100	1,000	250	1,500	—	—	
ø18x35.5 to 40	50	300	100	1,000	—	—	—	—	
69□Type 621 Type	ø22 to ø35*	—	100	—	—	—	—	—	—

\* Only overseas factory product.

### Tantalum Chip Capacitors

Classification	Size	Quantity (PCS.)		
		Long lead	Forming lead	Taping (reel)
Chip Type	P, A2	—	—	3,000
	A, B	—	—	2,000
	C, D0	—	—	500

### Electric Double Layer Capacitors

Series	Size	Quantity (PCS.)							
		Long lead		Forming lead		Taping (flat box)		Taping (reel)	
		Quantity per vinyl bag	Packaging box	Quantity per vinyl bag	Packaging box	Quantity per box	Packaging quantity	One reel quantity	Packaging quantity
DX-L, DXJ-L	ø11.5	100	4,000	—	—	750	6,000	—	—
DX-H, DX-Y DXJ-H, DXJ-V	ø11.5	—	—	200	8,000	—	—	—	—
DH, DB, DK, DBN, DBJ	ø13.5	—	—	200	4,000	—	—	—	—
	ø21.5	—	—	100	2,000	—	—	—	—
DC, DCK	ø6.8	—	—	200	24,000	—	—	—	—
DS, DSK	ø4.8	—	—	—	—	—	—	2,000	10,000
	ø6.8	—	—	—	—	—	—	1,500	6,000
DZ, DZN	ø8	200	1,000	—	—	—	—	—	—
	ø12.5x23	100	1,000	—	—	—	—	—	—
	ø12.5x31.5	100	800	—	—	—	—	—	—
	ø18	50	300	—	—	—	—	—	—
	ø25	—	100	—	—	—	—	—	—
DP	ø35	—	100	—	—	—	—	—	—
	ø35	—	50	—	—	—	—	—	—



## Aluminum Electrolytic Capacitors

### List of Contents

1. Type List for Aluminum Electrolytic Capacitors .....	6
2. Systematized Classification of Aluminum Electrolytic Capacitors .....	8
3. Recommended Land Pattern and Size for Chip Type .....	10
4. Lead Forming and Taping .....	11
5. Cautions for Using Aluminum Electrolytic Capacitors With Conductive Polymer Solid Electrolyte .....	16
6. Specifications for Aluminum Electrolytic Capacitors With Conductive Polymer Solid Electrolyte by Series .....	19
7. Cautions for Using Aluminum Electrolytic Capacitors .....	28
8. Recommended Soldering Conditions .....	32
9. Specifications for Chip Type, Miniature and Large Capacitance Aluminum Electrolytic Capacitors by Series .....	34
10. Specifications for Large Aluminum Electrolytic Capacitors for Audio by Series .....	98
11. Technical Notes for Aluminum Electrolytic Capacitors .....	113







■ Type List for Large and For Audio Aluminum Electrolytic Capacitors

Category	Series	Page	Applications	Feature							Category Temp. Range °C		Rated Voltage Range V.DC		Rated capacitance Range μF	Color of sleeve	JIS Configuration	Note			
				Thin and small Size	Reliability at 105°C					Low impedance	For Audio	Anti-cleaning solvent	Reflow Soldering Resistance	Max.					Min.	Max.	Min.
					1000hrs	2000hrs	3000hrs	5000hrs	10000hrs												
Large Capacitance Type	LA5	86	PCB Terminal, Snap-In Type	•								+85	-40	400	10	56 to 82000	Black	—			
	LH7	—										+85	-40	200	16	47 to 470	Black	692			
	L3J	—	105°C, Standard		•							+105	-40	200	10	150 to 22000	Black	692			
	LAG	88	High-Reliability, High Ripple	•	•							+105	-25	400	160	39 to 820	Black	692			
	LAH	90	High-Reliability, Ultra-Miniaturized	•	•							+105	-25	450	16	56 to 47000	Black	692			
	LAT	93	Super Miniaturization, High Ripple	•	•							+105	-25	400	160	82 to 2700	Black	692			
	LAV	—	105°C, Compatible with VDE		•							+105	-25	250	—	82 to 1000	Black	692			
	LUH	95	105°C, Durable against Over Voltage		•							+105	-25	400	200	68 to 1500	Black	692			
	LAX	96	105°C, Ultra-Longevity	•			•					+105	-25	400	160	56 to 1800	Black				
For Audio	RVO	98	Chip Type (PURECAP)	•					•	•	+85	-40	50	6.3	0.1 to 1000	Silver Brown	32				
	RVW	99	Chip Type 105°C (PURECAP)	•	•				•	•	+105	-40	50	6.3	0.1 to 1000	Silver Brown	32				
	RFS	100	High Grade (SILMIC I)						•		+85	-55	100	6.3	0.47 to 3300		04				
	ROS	101	High Grade (SILMIC)						•		+85	-40	100	16	2.2 to 4700		04				
	ROA	102	High Grade (Cerafine)						•		+85	-40	100	6.3	0.47 to 6800		04				
	ROB	103	Miniaturized Standard (TONEREX)						•		+85	-40	100	6.3	0.47 to 10000		04				
	R20	104	Miniaturized Standard	•					•		+85	-40	100	6.3	0.47 to 15000		04				
	R2A	105	7mm L	•					•		+85	-40	50	4	0.1 to 330		04				
	R3A	106	5mm L	•					•		+85	-40	50	4	0.1 to 220		04				
	RFO	107	Standard (PURECAP)	•					•		+85	-40	100	6.3	0.47 to 15000		04				
	RA2	108	Standard	•					•		+85	-40	100	6.3	0.47 to 15000		04				
	RA3	109	Miniaturized Standard	•					•		+85	-40	100	6.3	0.1 to 22000		04				
	RBD	110	Miniaturized Bipolar	•					•		+85	-40	100	6.3	0.1 to 4700		04				
	LAO	111	For Audio (TONEREX)						•		+85	-40	50	16	680 to 10000		692				

\* Be sure to "Cautions for Using Aluminum Electrolytic Capacitors", before using these products.

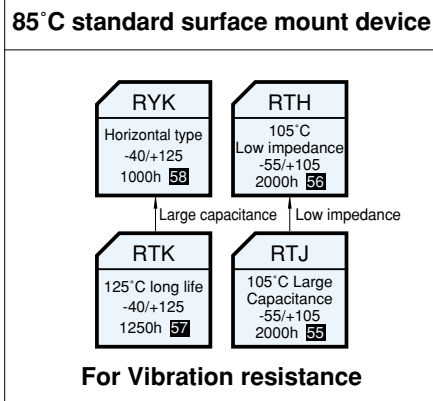
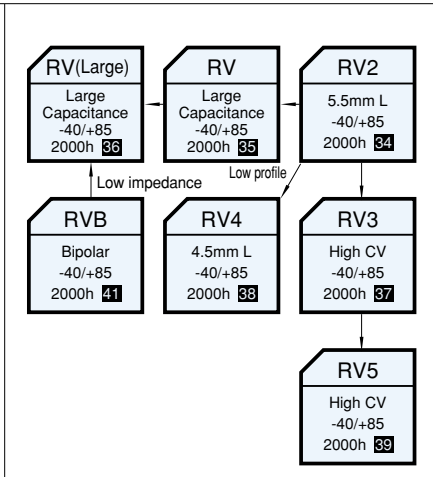
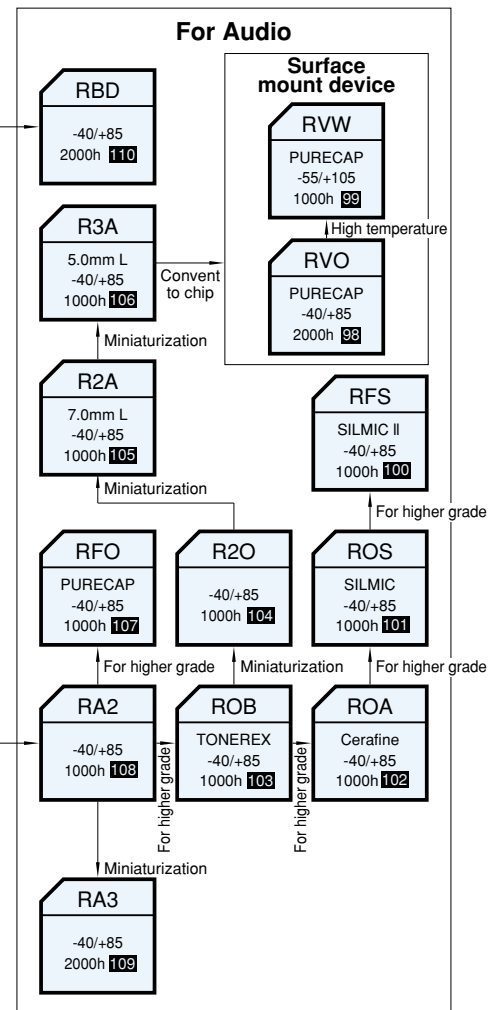
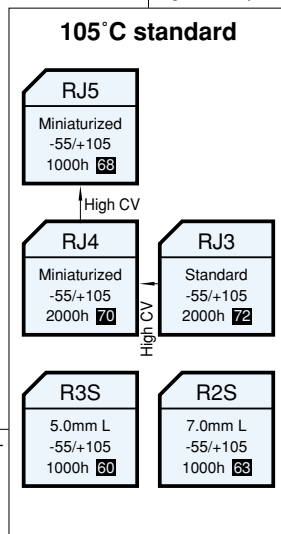
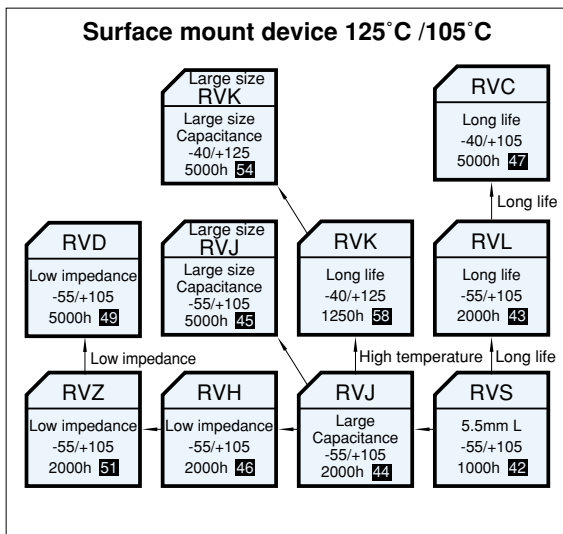
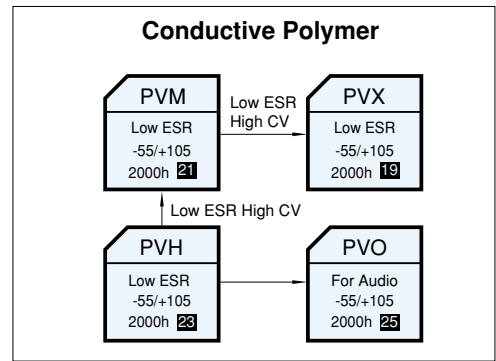
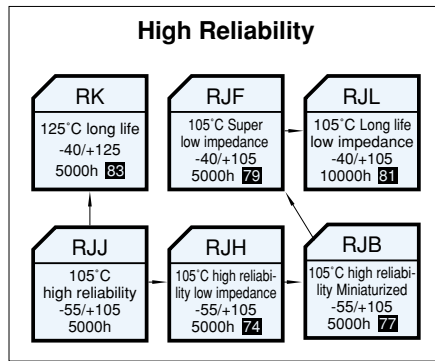
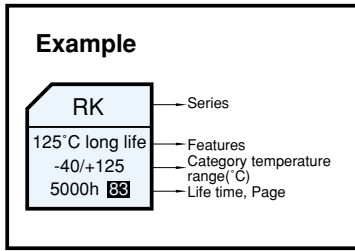
Old series were deleted from catalog, the productions were discontinued.

For new designation, please use the substitute series.

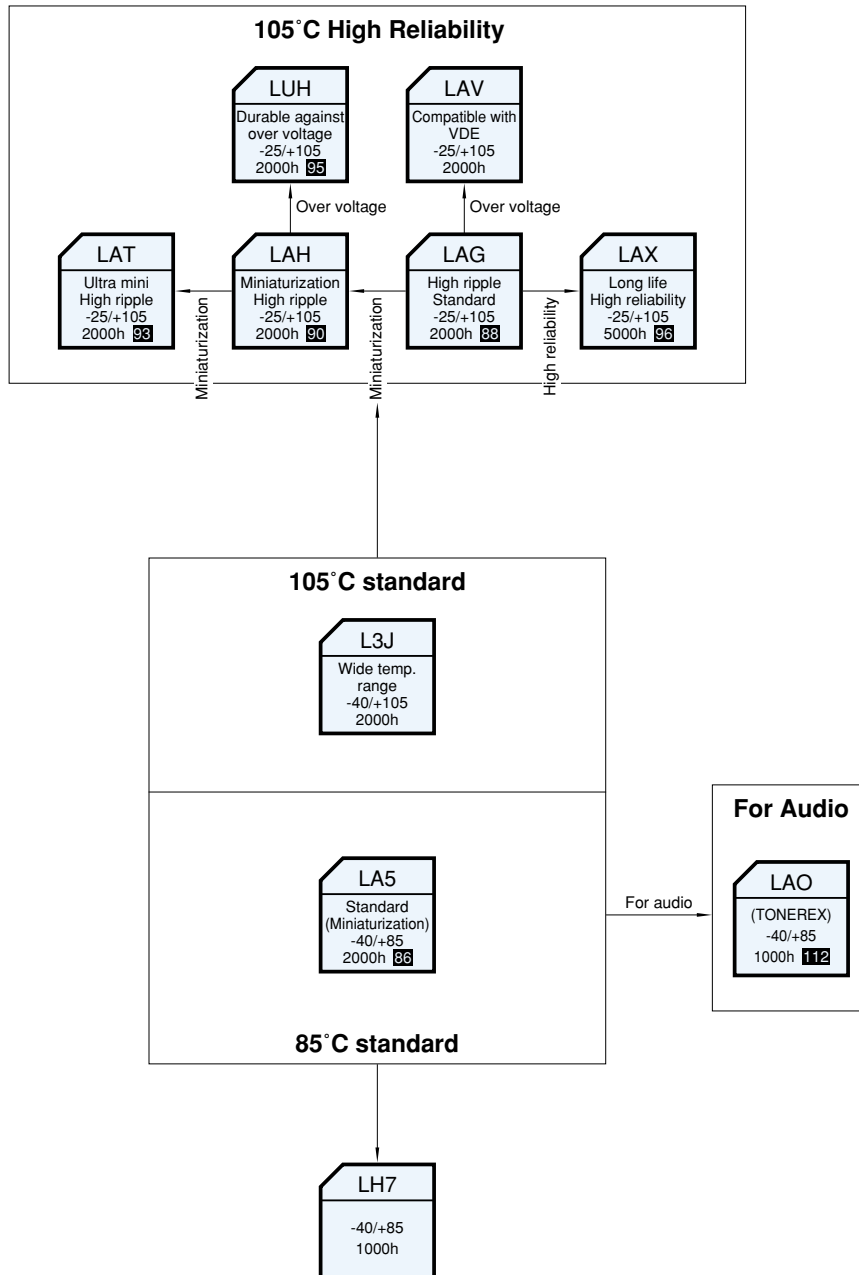
It is greatly appreciated that you would understand and accept the proposal stated in above.

Category	Series	JIS Configuration	Features	Substitute series	Page
Surface mounting type	RT	32	Higher capacitance, Vibration resistance	RTJ, RTH	55, 56
Standard type	RE2	04	Miniaturized standard	RE3	65
	RBP	04	Bipolarity standard	R2B	67
High reliability type	RSL	04	105°C Long Life	RK	83
	RKA	04	130°C Long Life	Consult us	-
Large capacitance type	LP5	692	PCB terminal, Snap-in type	LA5	86
	L3J	692	105°C Standard	LAH	90
	LPG	692	High reliability, High ripple	LAG	88
	LPH	692	High reliability, Ultra-miniaturized	LAH	90
	LPT	692	Super-miniaturized, High ripple	LAT	93
	LUV	692	105°C Compatible with VDE	LAV	—
	LPX	692	105°C Ultra-Long Life	LAX	96
For Audio	ROS (ø22 to 30)	04	High grade(SILMIC)	Consult us	—

Systematized Classification of Miniature and Chip Type Aluminum Electrolytic Capacitors



■ Systematized Classification of Large Aluminum Electrolytic Capacitors

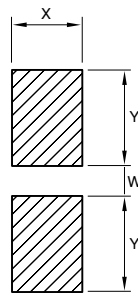


\* There are overseas factory product only on this page.

### Recommended land pattern and size

(Vertical chip type)

● Standard type

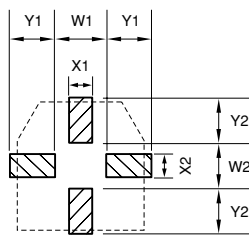


(Unit : mm)

Case Size ø D x L	Land Size			Thickness of Solder paste
	X	Y	W	
3 x 5.3	1.6	2.2	0.8	0.15
4 x 4.5, 5.3, 5.7, 5.8	1.6	2.6	1.0	0.15
5 x 4.5, 5.3, 5.7, 5.8	1.6	3.0	1.4	0.15
6.3 x 4.5, 5.3, 5.7, 5.8	1.6	3.6	1.9	0.15
6.3 x 7.7	1.6	3.6	1.9	0.15
8 x 6.5, 6.7	1.6	4.0	2.1	0.15
8 x 10, 10.5	2.5	* 3.5	* 3.0	0.15
10 x 7.7, 10, 10.5	2.5	* 4.0	* 4.0	0.15
12.5 x 13.5, 17.5	3.2	6.0	4.0	0.15

\* For Vibration resistance use  
 ø8x6.5 Y=4.5 W=1.0  
 ø8x10, ø8x10.5 Y=4.0 W=2.5  
 ø10x10, ø10x10.5 Y=4.5 W=3.0

● For vibration resistance type

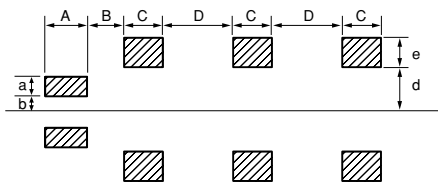


(Unit : mm)

Case Size ø D x L	Land Size						Thickness of Solder paste
	X1	X2	Y1	Y2	W1	W2	
8 x 10	2.5	2.5	3.0	3.5	4.0	3.0	0.20
10 x 10.5	2.5	2.5	4.0	4.5	4.0	3.0	0.20

### (Horizontal chip type)

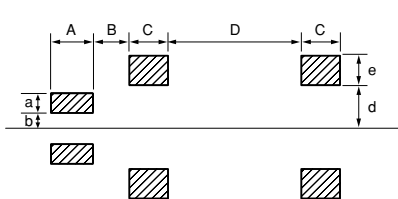
● □ 9.5 x 24.0 (8 pin type)



(Unit : mm)

8 pin	
A	4.0
B	1.0
C	3.0
D	5.5
a	1.5
b	1.0
d	3.0
e	2.0
Thickness of Solder paste	0.15

● □ 9.5 x 19.0 (6 pin type)

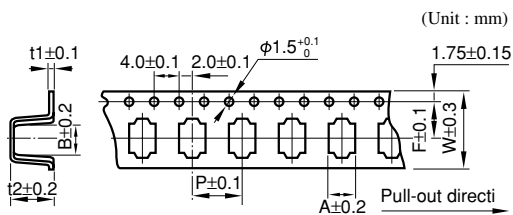


(Unit : mm)

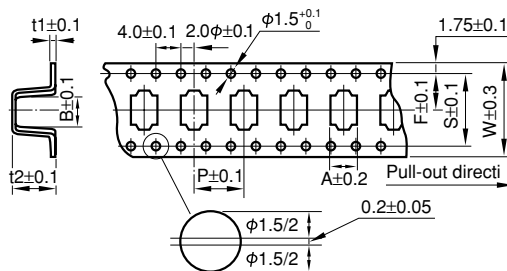
6 pin	
A	4.0
B	1.0
C	3.0
D	9.0
a	1.5
b	1.0
d	3.0
e	2.0
Thickness of Solder paste	0.15

## ■ Taping

### ■ Carrier tape dimension (taping polarity R)

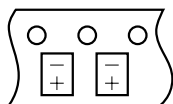


### ● Series RYK, RV(φ12.5), RVJ(φ12.5) RVK(φ12.5)

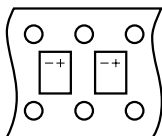


### ■ Taping polarity

(The all series except RVB and RYK)



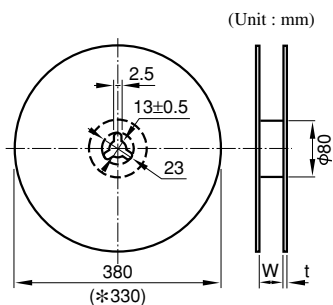
(Series RYK)



(Unit: mm)

Outside size φ DxL	W	A	B	P	t2	F	t1	S
3x5.3	12	3.4	3.4	8.0	5.9	5.5	0.4	—
4x4.5	12	4.7	4.7	8.0	4.8	5.5	0.4	—
4x5.3	12	4.7	4.7	8.0	5.8	5.5	0.4	—
4x5.7, 5.8	12	4.7	4.7	8.0	6.2	5.5	0.4	—
5x4.5	12	5.7	5.7	12	4.8	5.5	0.4	—
5x5.3	12	5.7	5.7	12	5.8	5.5	0.4	—
5x5.7, 5.8	12	5.7	5.7	12	6.2	5.5	0.4	—
6.3x4.5	16	7.0	7.0	12	4.8	7.5	0.4	—
6.3x5.3	16	7.0	7.0	12	5.8	7.5	0.4	—
6.3x5.7, 5.8	16	7.0	7.0	12	6.2	7.5	0.4	—
6.3x7.7	16	7.0	7.0	12	8.3	7.5	0.4	—
8x6.5	16	8.7	8.7	12	6.8	7.5	0.4	—
8x6.7	24	8.7	8.7	12	7.2	11.5	0.4	—
8x10	24	8.7	8.7	16	11	11.5	0.4	—
8x10.5	24	8.7	8.7	16	11.5	11.5	0.4	—
10x7.7	24	10.7	10.7	16	8.2	11.5	0.4	—
10x10	24	10.7	10.7	16	11	11.5	0.4	—
10x10.5	24	10.7	10.7	16	11.5	11.5	0.4	—
* 12.5x13.5	32	13.4	13.4	24	14.5	14.2	0.5	28.4
* 12.5x17.5	32	13.4	13.4	24	18.5	14.2	0.5	28.4
* 9.5x19.0	44	9.9	22.9	16	9.5	20.2	0.4	40.4
* 9.5x24.0	44	9.9	27.9	16	9.5	20.2	0.4	40.4

### ■ Reel dimension



(Unit: mm)

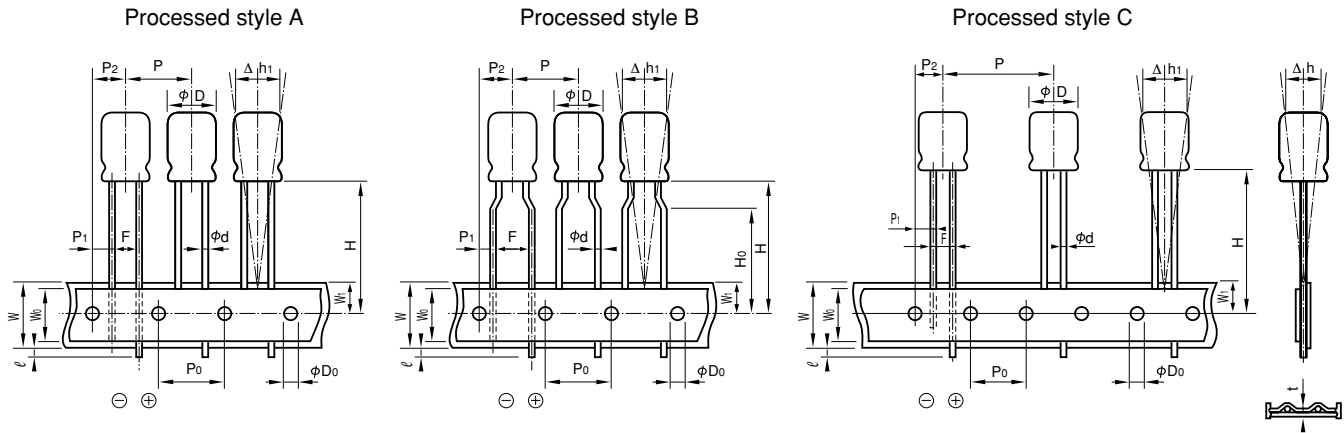
Outside size φ DxL	Reel dimension	
	W	t
3, 4	14	3
5	14	3
6.3	18	3
8x6.5	18	3
8x6.7	26	3
8, 10	26	3
* 12.5	34	3
* 9.5x24.0	45	3
* 9.5x19.0	45	3

### ■ Packing quantity (Reel)

Outside size φ DxL	Quantity (PCS.)
3, 4	2000
5, 6.3	1000
8x6.5	1000
8x6.7	1000
* 8, 10	500
* 12.5x13.5	200
* 12.5x17.5	150
* 9.5x19.0	400
9.5x24.0	400

### ■ Taping

- For automatic insertion (radial lead type)



\*The shape of a lead wire sandwiched by the mounting strips may differ from the ones shown in the figures.

### Product Size Table

Unit: mm

Item	Symbol	Tolerance	5L to 7L	
			ø3 to ø8(except ø8x7L)	ø4 to ø8
Lead forming symbol	—	—	T36	T58
Style	—	—	A or B	
Lead-wire diameter	ød	±0.05	0.4 or 0.45	
Lead to lead distance	F	+0.8 -0.2	2.5	5.0
Height of component from tape center	H	+0.75 -0.5	18.5	17.5
Lead-wire clinch height	H <sub>0</sub>	±0.5	—	16.0
Pitch of componet	P	±1.0	12.7	
Feed hole pitch	P <sub>0</sub>	±0.3	12.7	
Hole center to lead	P <sub>1</sub>	±0.5	5.1	3.85
Hole center to component	P <sub>2</sub>	±1.0	6.35	
Tape width	W	±0.5	18.0	
Hold down tape width	W <sub>0</sub>	Min.	6.0	
Feed hole position	W <sub>1</sub>	±0.5	9.0	
Max. lead protrusion	ℓ	Max.	1.0	
Feed hole diameter	øD <sub>0</sub>	±0.2	4.0	
Alignment of component to center	Δh	±1.0	0	
Alignment of component to center	Δh <sub>1</sub>	±1.0	0	
Total tape thickness	t	±0.2	0.7	



■ Taping

- For automatic insertion (radial lead type)

Product Size Table

Unit: mm

Item	Symbol	Tolerance	11L to 25L						
			ø5, ø6.3			ø8	ø10	ø12.5	ø16, ø18
Lead forming symbol	—	—	T36	T58	T2	T2	T2	T4	T50
Style	—	—	A or B		B		A		C
Lead-wire diameter	ød	±0.05	0.5 or 0.6			0.6			0.8
Lead to lead distance	F	+0.8 -0.2	2.5		5.0			7.5	
Height of component from tape center	H	+0.75 -0.5	18.5	17.5	18.5	20.0	18.5		18.5 <sup>+1.5</sup> -0.5
Lead-wire clinch height	H <sub>0</sub>	±0.5	—		16.0		—		
Pitch of componet	P	±1.0	12.7					15.0	30.0
Feed hole pitch	P <sub>0</sub>	±0.3	12.7					15.0	
Hole center to lead	P <sub>1</sub>	+0.5 (10 to ø18 ±0.7)	5.1		3.85			5.0	3.75
Hole center to component	P <sub>2</sub>	±1.0	6.35					7.5	
Tape width	W	±0.5	18.0						
Hold down tape width	W <sub>0</sub>	Min.	6.0						
Feed hole position	W <sub>1</sub>	±0.5	9.0						
Max. lead protrusion	ℓ	Max.	1.0						
Feed hole diameter	øD <sub>0</sub>	±0.2	4.0						
Alignment of component to center	Δh	±1.0	0						
Alignment of component to center	Δh <sub>i</sub>	±1.0	0						
Total tape thickness	t	±0.2	0.7						

Part numbering system (example: Series RJB, 10V470μF, 5mm pitch taping)

RJB	—	10	V	471	M	G3	#	—	T2
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Additional symbol			Taping symbol

### Lead Forming

• In order to facilitate insertion into printed circuit board, lead wires are cut or formed.

Product Size Table

Unit: mm

Forming name	Lead forming symbol	Dimension			Style	Outline drawing
		F (Lead pitch)	φD (Case diameter)	L (Applicable case length)		
Forming cut	F10	2.0	4	5,7	B	<p>Processed style A</p> <p>Processed style B</p>
	F 1		5	5 to 11.5	A	
	F12	2.5	4	5,7	B	
	F12		5	5 to 11.5	B	
	F 1		6.3	5 to 11.5	A	
	F 4	3.5	4	5,7	B	
	F 4		5	5,7	B	
	F 4		6.3	5,7	B	
	F 1		8	7 to 11.5	A	
	F	5.0	4	5,7	B	
	F		5	5 to 11.5	B	
	F		6.3	5 to 11.5	B	
	F		8	5 to 11.5	B	
	F		10	9 to 30	A	
	F		12.5	15 to 40	A	
	F		7.5	16	15 to 40	
	F	18		15 to 40	A	
	Snap-in	S 1	5.0	4	5,7	
S 1		5		5 to 11.5	B	
S 1		6.3		5 to 11.5	B	
S 1		8		7 to 11.5	B	
S 1		10		9 to 30	A	
S 1		12.5		15 to 40	A	
S 1		7.5	16	15 to 40	A	
S 1			18	15 to 40	A	

Part numbering system (example: Series RJB, 10V470μF, 5mm pitch forming cut)

RJB	—	10	471	M	G3	#	—	F
Series code		Rated voltage symbol	Rated capacitance symbol	Capacitance tolerance symbol	Additional symbol			Taping symbol

# Aluminum Electrolytic Capacitors With Conductive Polymer Solid Electrolyte

### ■ Cautions for Using Aluminum Electrolytic Capacitors With Conductive Polymer Solid Electrolyte

Please be sure to read this specification before using this product.

Before placing an order, please inquire about the Product Specification to check details.

#### ■ Cautions for Usage

##### 1. Solid conductive polymer aluminum electrolytic capacitors are polarized.

- Using a capacitor with reversed polarity causes abnormal current flow, resulting in a short circuit.
- Cannot use for the circuit to which the polarity reverses by ripple voltage.

##### 2. Prohibited Circuits

- Since leakage current problem may arise, capacitors cannot be used in the following circuits.
  - ① Coupling circuits
  - ② Circuits greatly affected by leakage current

##### 3. Use capacitors within the rated voltage.

- The application of voltages exceeding the rated voltage can significantly increase leakage current, resulting in a short failure. Please do not apply a voltage exceeding the rated voltage.

##### 4. Be careful of excessive rush current.

- Using capacitors in the circuit where excessive rush current passes may cause characteristic deterioration or a short. When the rush current exceeds 10 A, we recommend use of protection circuits to ensure high reliability.

##### 5. Use the allowable ripple voltage and the rated ripple current below the specified values.

- When superimposing a ripple voltage on a DC bias voltage, exercise care that the peak voltage value does not exceed the rated voltage and does not reverse the polarity.
- The rated ripple current shall be below the specified value.

##### 6. Changes in characteristics due to operating temperature

- The characteristics of solid conductive polymer aluminum electrolytic capacitors vary by temperature as follows. These variations are temporary and recover when the temperature goes back (except for the case of characteristic deterioration because of high temperatures over a long time). Note that using capacitors over the upper category temperature increases leakage current, resulting in a short and destruction.

Be careful of the capacitor temperature considering not only the ambient temperature where the equipment is placed and the temperature inside the equipment but also radiation heat from the heating element inside the equipment, and self-heat

generation by ripple current.

- ① Capacitance expressed in the value at 20°C, 120 Hz increases with increased temperature and decreases with decreasing temperature.
- ② Tangent of loss angle ( $\tan \delta$ ) expressed in the value at 20°C, 120 Hz is temperature-independent.
- ③ Equivalent series resistance (ESR) expressed in the value at 20°C, 100 kHz is temperature-independent.
- ④ Leakage current increases with increased temperature and decreases with decreasing temperature.

##### 7. Changes in characteristics due to frequency

- The characteristics of solid conductive polymer aluminum electrolytic capacitors vary by operating frequency as follows.
  - ① Capacitance expressed in the value at 20°C, 120 Hz decreases with increased frequency.
  - ② Tangent of loss angle ( $\tan \delta$ ) expressed in the value at 20°C, 120 Hz increases with increased frequency.
  - ③ Equivalent series resistance (ESR) expressed in the value at 20°C, 100 kHz increases with decreasing frequency.

##### 8. Failure modes of solid conductive polymer aluminum electrolytic capacitors

- The failure modes of solid conductive polymer aluminum electrolytic capacitors are a wear-out failure by deterioration of electrical performance and a random failure by a short. The failure rate level is 1%/1,000h at the reliability level of 60% with the specified voltage applied at 105°C.
- If a short occurs and continues with the application of a voltage exceeding the rated voltage, increasing the internal temperature, the internal pressure increases by vaporization of the cathode material, which may cause the aluminum case to come off.

##### 9. Operating environments

- Do not store capacitors in an environment directly exposed to water, saltwater spray, oil spill or condensation.
- Do not store capacitors in an environment filled with toxic gas such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.
- Do not store capacitors in a place exposed to ozone, ultraviolet rays, or radiation.

##### 10. Fumigation Process

- Before transportation of electronic equipment to overseas, fumigation process may be subjected to wooden packing material with a halogen (compound) gas such as methyl bromide. Exercise care that this halogen gas may corrode capacitors. Also, be careful of epidemic preventive agent as corrosive component such as halogen may be contained.

#### 11. The case of solid conductive polymer aluminum electrolytic capacitors and the cathode terminal are not insulated.

- The case and the cathode terminal are not insulated as being connected through inconstant resistance.

#### 12. Double-sided PCB's

- When using capacitors on a double-sided PCB, exercise care that the wiring pattern does not touch the area where the capacitors are mounted. Failure to do so may cause a short to occur to the PCB depending on the mounting conditions.

#### 13. Regarding Connection of Solid Conductive Polymer Aluminum Electrolytic Capacitors

- When connecting more than one capacitor in parallel, consider the current balance.

#### 14. Other Notes

- Do not use capacitors on a circuit where rapid charge and discharge are repeated.
- Electrical characteristics of capacitors vary by variations in temperature and frequency. Please consider these variations when designing a circuit.

### ■Cautions for Mounting

#### 1. Cautions for Mounting

- Do not reuse capacitors that have been assembled in a set and energized. Capacitors cannot be reused except for those which have been measured on electrical performance during periodic inspection.
- Before mounting, confirm the capacitor ratings (rated capacitance and rated voltage).
- Capacitors may generate transient recovery voltage. In this case, discharge through a resistor of about 1 k $\Omega$ .
- Before mounting, confirm the polarity of capacitor.
- Do not drop capacitors onto a floor nor use them.
- Do not mount deformed capacitors.
- Do not mount heating parts around capacitors and on the back of the PCB under or back of capacitors).

#### 2. Do not apply excessive pressure to the capacitor or its terminals

- Be careful of the shock force that can be produced

by absorbers, product checkers, and centering on automatic inserters and installers.

#### 3. Soldering

- Do not solder capacitor body by dipping into melted solder.
- Soldering conditions (preheating, soldering temperature, terminal dipping time) should be within the ranges specified in the catalog or the delivery specification.
- Flux should not adhere to the parts other than the terminals.
- When using a soldering iron, avoid excessive stress to capacitor body.
- In reflow soldering, the reflow should be conducted once. Please be sure to consult with us if reflow must be conducted twice.
- Although leakage current may increase (from a few  $\mu$ A to hundreds of  $\mu$ A) after soldering, it can be reduced through self-repair by applying voltage. It is advised to operate the set properly after treating with the recommended voltage.
- In case of a long-term use of equipment, control the soldering characteristics so that capacitors and PCB do not fail to connect to avoid abnormal current passage by a failure of soldering to mount.

#### 4. Handling after Soldering

- Do not tilt, fall, raise or twist capacitor body.
- Do not pick up or move PCB by holding a capacitor.
- Do not bump capacitors against objects. When stacking PCB's, make sure that capacitors do not touch the PCB's or other components.
- Do not subject capacitors to excessive stress.

#### 5. Cleaning after Soldering

- Recommended cleaning method

##### ① cleaning solutions:

- (a) CLEANTHROUGH 710M, 750H, 750L
- (b) PINEALPHA ST-100S
- (c) Techno Care FRW-4~17
- (d) Isopropyl alcohol (2-propanol)

##### ② Cleaning conditions:

- (a) The temperature of cleaning solution shall be less than 60°C.
- (b) Use immersion or ultrasonic waves within two minutes.
- (c) After cleaning, capacitors and PCB's shall thoroughly be rinsed and dried with hot blast for more than 10 minutes. The temperature of such breeze should be less than the upper category temperature.
- (d) After cleaning, do not keep capacitors in cleaning solution atmosphere or airtight containers.

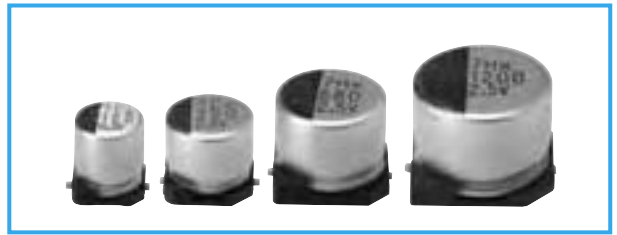
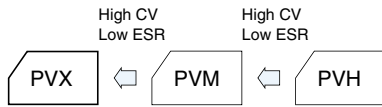
#### NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

Chip Type

- GREEN CAP
- SMD
- Low ESR
- 105°C 2000hours
- Anti-cleaning solvent

- Super low E.S.R. and high ripple current are realized.
- Guaranteed 105°C, 2000 hours.



Marking color : Black print

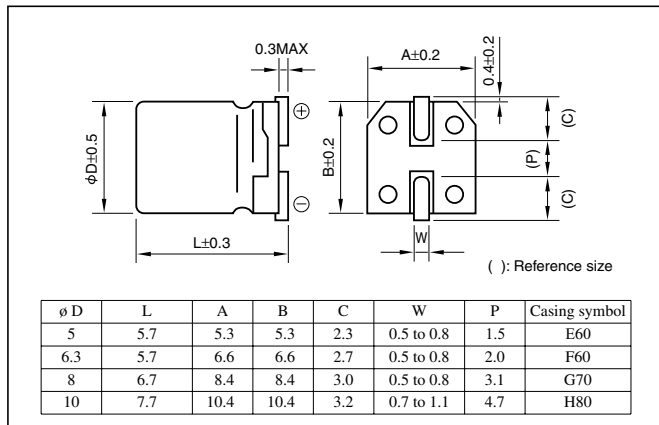
Specifications

Item	Performance	
Category temperature range (°C)	-55 to +105	
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)	
Leakage current (µA) *Note	Less than 0.2CV C: Rated capacitance(µF); V: Rated voltage(V) (20°C)	
Tangent of the loss angle (tanδ)	Less than 0.12 (20°C,120Hz)	
Characteristics at high and low temperature	Impedance ratio (max.) Z-25°C / Z+20°C : 1.15 Z-55°C / Z+20°C : 1.25 (120Hz)	
Endurance (105°C) (Applied ripple current)	Test time	2000 hours
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±20% of initial value
	Tangent of the loss angle	150% or less of the initial specified value
	E.S.R. change	150% or less of the initial specified value
Bias Humidity 60°C, 90 to 95%RH	Test time	500 hours
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±20% of initial value
	Tangent of the loss angle	150% or less of the initial specified value
	E.S.R. change	150% or less of the initial specified value
Characteristics of applied surge voltage	The capacitors shall be subject to 1000 cycles each consisting of charge with the surge voltage specified at 15 to 35°C for 30 seconds through a protective resistor (Rc=1kΩ) in 6 minutes per cycle. Surge voltage : 1.15 times of rated voltage	
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±20% of initial value
	Tangent of the loss angle	150% or less of the initial specified value
	E.S.R. change	150% or less of the initial specified value
Failure tare	1% per 1000 hours maximum (Confidence level 60% at 105°C)	

\*Note: If any doubt arises, measure the leakage current after following voltage application treatment.  
Voltage application treatment: DC rated voltage are applied to the capacitors for 120 minutes at 105°C.

Outline Drawing

Unit: mm



Series code	Rated voltage symbol	Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Taping symbol
PVX	4	V	151	M	E60

- Land pattern size are described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Standard Ratings

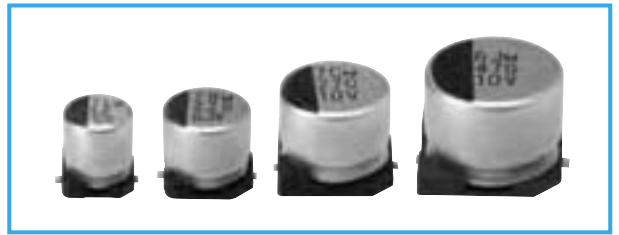
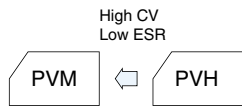
Rated capacitance(μF)	Item	2.5			4			6.3			10		
		Case	E.S.R.	Rated ripple current	Case	E.S.R.	Rated ripple current	Case	E.S.R.	Rated ripple current	Case	E.S.R.	Rated ripple current
		∅ DxL(mm)	(mΩ)	(mA <sub>rms</sub> )	∅ DxL(mm)	(mΩ)	(mA <sub>rms</sub> )	∅ DxL(mm)	(mΩ)	(mA <sub>rms</sub> )	∅ DxL(mm)	(mΩ)	(mA <sub>rms</sub> )
100	—	—	—	—	—	—	5x5.7	15	3100	5x5.7	15	3100	
120	—	—	—	—	—	—	—	—	—	6.3x5.7	15	3200	
150	5x5.7	10	3800	5x5.7	10	3800	5x5.7	15	3100	—	—	—	
220	5x5.7	10	3800	5x5.7	10	3800	6.3x5.7	9	4000	8x6.7	10	3800	
270	5x5.7	10	3800	—	—	—	—	—	—	—	—	—	
330	—	—	—	6.3x5.7	9	4000	—	—	—	8x6.7	10	3800	
390	6.3x5.7	9	4000	—	—	—	8x6.7	8	4300	—	—	—	
470	—	—	—	8x6.7	8	4300	8x6.7	8	4300	10x7.7	10	4000	
560	8x6.7	8	4300	8x6.7	8	4300	—	—	—	—	—	—	
680	8x6.7	8	4300	10x7.7	8	4600	—	—	—	—	—	—	
820	—	—	—	—	—	—	10x7.7	8	4600	—	—	—	
1000	10x7.7	8	4600	10x7.7	8	4600	—	—	—	—	—	—	
1200	10x7.7	8	4600	—	—	—	—	—	—	—	—	—	

Aluminum Electrolytic Capacitors  
With Conductive Polymer Solid  
Electrolyte



**Chip Type** GREEN CAP SMD Low ESR 105°C 2000hours Anti-cleaning solvent

- Super low E.S.R. and high ripple current are realized.
- Guaranteed 105°C, 2000 hours.



Marking color : Black print

**Specifications**

Item	Performance	
Category temperature range (°C)	-55 to +105	
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)	
Leakage current (μA) *Note	Less than 0.2CV C: Rated capacitance(μF); V: Rated voltage(V) (20°C)	
Tangent of the loss angle (tanδ)	Less than 0.12 (20°C,120Hz)	
Characteristics at high and low temperature	Impedance ratio (max.) Z-25°C / Z+20°C : 1.15 Z-55°C / Z+20°C : 1.25 (120Hz)	
Endurance (105°C) (Applied ripple current)	Test time	2000 hours
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±20% of initial value
	Tangent of the loss angle	150% or less of the initial specified value
	E.S.R. change	150% or less of the initial specified value
Bias Humidity 60°C, 90 to 95%RH	Test time	500 hours
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±20% of initial value
	Tangent of the loss angle	150% or less of the initial specified value
	E.S.R. change	150% or less of the initial specified value
Characteristics of applied surge voltage	The capacitors shall be subject to 1000 cycles each consisting of charge with the surge voltage specified at 105°C for 30 seconds through a protective resistor (Rc=1kΩ) in 6 minutes per cycle. Surge voltage : 1.15 times of rated voltage	
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±20% of initial value
	Tangent of the loss angle	150% or less of the initial specified value
	E.S.R. change	150% or less of the initial specified value
Failure tare	1% per 1000 hours maximum (Confidence level 60% at 105°C)	

\*Note: If any doubt arises, measure the leakage current after following voltage application treatment.  
Voltage application treatment: DC rated voltage are applied to the capacitors for 120 minutes at 105°C.

**Outline Drawing**

Unit: mm

φ D	L	A	B	C	W	P	Casing symbol
5	5.7	5.3	5.3	2.3	0.5 to 0.8	1.5	E60
6.3	5.7	6.6	6.6	2.7	0.5 to 0.8	2.0	F60
8	6.7	8.4	8.4	3.0	0.5 to 0.8	3.1	G70
10	7.7	10.4	10.4	3.2	0.7 to 1.1	4.7	H80

**Part numbering system (example: 4V151M E60)**

PVM	4	V	151	M	E60	□
Series code	Rated voltage symbol	Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Taping symbol	

- Land pattern size are described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Standard Ratings

Rated voltage(V)	Item	2.5			4			6.3			10			16		
		Case	E.S.R.	Rated ripple current	Case	E.S.R.	Rated ripple current	Case	E.S.R.	Rated ripple current	Case	E.S.R.	Rated ripple current	Case	E.S.R.	Rated ripple current
Rated capacitance(μF)	φ DxL(mm)	(mΩ)	(mAmps)	φ DxL(mm)	(mΩ)	(mAmps)	φ DxL(mm)	(mΩ)	(mAmps)	φ DxL(mm)	(mΩ)	(mAmps)	φ DxL(mm)	(mΩ)	(mAmps)	
33	—	—	—	—	—	—	—	—	—	—	—	—	5x5.7	35	2070	
39	—	—	—	—	—	—	—	—	—	—	—	—	5x5.7	35	2070	
47	—	—	—	—	—	—	—	—	—	—	5x5.7	28	2310	—	—	
56	—	—	—	—	—	—	—	—	—	—	5x5.7	28	2310	—	—	
68	—	—	—	—	—	—	—	—	—	—	5x5.7	28	2310	6.3x5.7	28	2340
100	—	—	—	5x5.7	22	2610	5x5.7	24	2500	—	—	—	8x6.7	24	3010	
120	—	—	—	—	—	—	5x5.7	24	2500	6.3x5.7	25	2530	8x6.7	24	3010	
150	—	—	—	5x5.7	22	2610	—	—	—	—	—	—	—	—	—	
180	5x5.7	21	2670	—	—	—	—	—	—	—	—	—	—	—	—	
220	—	—	—	—	—	—	6.3x5.7	15	3160	8x6.7	21	3220	10x7.7	22	3450	
270	—	—	—	6.3x5.7	15	3160	—	—	—	8x6.7	21	3220	—	—	—	
330	—	—	—	6.3x5.7	15	3160	8x6.7	14	3950	—	—	—	—	—	—	
390	6.3x5.7	15	3160	—	—	—	8x6.7	14	3950	—	—	—	—	—	—	
470	—	—	—	8x7.7	14	3950	—	—	—	10x7.7	19	3800	—	—	—	
560	8x6.7	13	3600	8x6.7	14	3950	—	—	—	—	—	—	—	—	—	
680	8x6.7	13	3600	—	—	—	—	—	—	—	—	—	—	—	—	
820	—	—	—	—	—	—	10x7.7	14	4300	—	—	—	—	—	—	
1000	—	—	—	10x7.7	14	4300	—	—	—	—	—	—	—	—	—	
1200	10x7.7	13	4450	—	—	—	—	—	—	—	—	—	—	—	—	

(Note) Rated ripple current : 105°C, 100kHz ; E.S.R. : 20°C, 100kHz

Aluminum Electrolytic Capacitors  
With Conductive Polymer Solid  
Electrolyte

Chip Type

- GREEN CAP
- SMD
- Low ESR
- 105°C 2000hours
- Anti-cleaning solvent

- Super low E.S.R. and high ripple current are realized.
- Guaranteed 105°C, 2000 hours.



Marking color : Black print

PVH

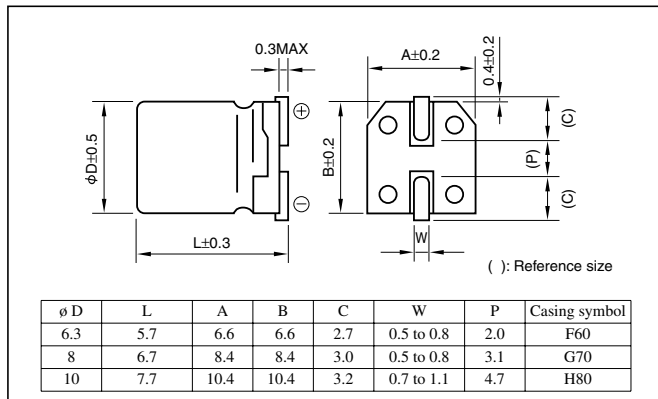
Specifications

Item	Performance						
Category temperature range (°C)	-55 to +105						
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)						
Leakage current (μA) *Note	<table border="1"> <tr> <td>Rated voltage (V)</td> <td>2.5 to 20</td> <td>25</td> </tr> <tr> <td>Leakage current (μA)</td> <td>Less than 0.2 CV</td> <td>Less than 0.5 CV</td> </tr> </table>	Rated voltage (V)	2.5 to 20	25	Leakage current (μA)	Less than 0.2 CV	Less than 0.5 CV
	Rated voltage (V)	2.5 to 20	25				
Leakage current (μA)	Less than 0.2 CV	Less than 0.5 CV					
C: Rated capacitance(μF); V: Rated voltage(V) (20°C)							
Tangent of the loss angle (tanδ)	Less than 0.12 (20°C,120Hz)						
Characteristics at high and low temperature	Impedance ratio (max.) $Z_{-55°C} / Z_{+20°C} : 1.50$ (120Hz)						
Endurance (105°C) (Applied ripple current)	Test time	2000 hours					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±20% of initial value					
	Tangent of the loss angle	150% or less of the initial specified value					
	E.S.R. change	200% or less of the initial specified value					
Damp heat, steady state (humidity) 60°C, 90 to 95%RH	Test time	500 hours					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±20% of initial value					
	Tangent of the loss angle	150% or less of the initial specified value					
	E.S.R. change	200% or less of the initial specified value					
Characteristics of applied surge voltage	The capacitors shall be subject to 1000 cycles each consisting of charge with the surge voltage specified at 15 to 35°C for 30 seconds through a protective resistor (Rc=1kΩ) in 6 minutes per cycle. Surge voltage : 1.15 times of rated voltage						
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±20% of initial value					
	Tangent of the loss angle	150% or less of the initial specified value					
	E.S.R. change	200% or less of the initial specified value					
Failure tare	1% per 1000 hours maximum (Confidence level 60% at 105°C)						

\*Note: If any doubt arises, measure the leakage current after following voltage application treatment.  
Voltage application treatment: DC rated voltage are applied to the capacitors for 120 minutes at 105°C.

Outline Drawing

Unit: mm



- Land pattern size are described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Part numbering system (example: 4V151M F60 Z)

PVH	4	V	151	M	F60	Z	
Series code	Rated voltage symbol	Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol			Taping symbol

Standard Ratings

Rated voltage(V)	Item	2.5			4			6.3			10			16			20			25		
		Case	E.S.R. (mΩ)	Rated ripple current (mA rms)	Case	E.S.R. (mΩ)	Rated ripple current (mA rms)	Case	E.S.R. (mΩ)	Rated ripple current (mA rms)	Case	E.S.R. (mΩ)	Rated ripple current (mA rms)	Case	E.S.R. (mΩ)	Rated ripple current (mA rms)	Case	E.S.R. (mΩ)	Rated ripple current (mA rms)	Case	E.S.R. (mΩ)	Rated ripple current (mA rms)
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6.3x5.7	65	1500
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6.3x5.7	50	1800
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
39	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
56	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
68	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
82	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
120	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
150	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
180	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
220	6.3x5.7	25	2500	8x6.7	25	3020	8x6.7	25	3020	—	—	—	—	—	—	—	—	—	—	—	—	—
270	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
330	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
470	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
560	8x6.7	23	3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
680	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1000	10x7.7	19	4240	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 105°C, 100kHz ; E.S.R. : 20°C, 100kHz

Aluminum Electrolytic Capacitors  
With Conductive Polymer Solid  
Electrolyte

Chip Type For Audio

- GREEN CAP
- SMD
- Low ESR
- 105°C 2000hours
- For audio
- Anti-cleaning solvent

- A conductive Polymer electrolyte is adopted.
- Super low E.S.R. and high ripple current are realized.
- Guaranteed 105°C, 2000 hours.
- Use materials are selected carefully, the high quality is realized.



Marking color : Black print

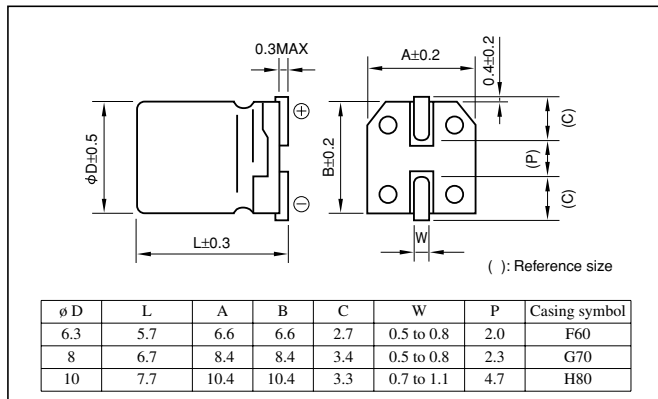
Specifications

Item	Performance						
Category temperature range (°C)	-55 to +105						
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)						
Leakage current (μA) *Note	<table border="1"> <tr> <td>Rated voltage (V)</td> <td>4 to 20</td> <td>25</td> </tr> <tr> <td>Leakage current (μA)</td> <td>Less than 0.2 CV</td> <td>Less than 0.5 CV</td> </tr> </table>	Rated voltage (V)	4 to 20	25	Leakage current (μA)	Less than 0.2 CV	Less than 0.5 CV
	Rated voltage (V)	4 to 20	25				
Leakage current (μA)	Less than 0.2 CV	Less than 0.5 CV					
C: Rated capacitance(μF); V: Rated voltage(V) (20°C)							
Tangent of the loss angle (tanδ)	Less than 0.12 (20°C,120Hz)						
Characteristics at high and low temperature	Impedance ratio (max.) $Z_{-55°C} / Z_{+20°C} : 1.50$ (120Hz)						
Endurance (105°C) (Applied ripple current)	Test time	2000 hours					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±20% of initial value					
	Tangent of the loss angle	150% or less of the initial specified value					
	E.S.R. change	200% or less of the initial specified value					
Damp heat, steady state (humidity) 60°C, 90 to 95%RH	Test time	500 hours					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±20% of initial value					
	Tangent of the loss angle	150% or less of the initial specified value					
	E.S.R. change	200% or less of the initial specified value					
Characteristics of applied surge voltage	The capacitors shall be subject to 1000 cycles each consisting of charge with the surge voltage specified at 15 to 35°C for 30 seconds through a protective resistor (Rc=1kΩ) in 6 minutes per cycle. Surge voltage : 1.15 times of rated voltage						
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±15% of initial value					
	Tangent of the loss angle	150% or less of the initial specified value					
	E.S.R. change	200% or less of the initial specified value					
Failure rate	1% per 1000 hours maximum (Confidence level 60% at 105°C)						

\*Note: If any doubt arises, measure the leakage current after following voltage application treatment.  
Voltage application treatment: DC rated voltage are applied to the capacitors for 120 minutes at 105°C.

Outline Drawing

Unit: mm



- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Part numbering system (example: 4V151M F60)					
PVO	4	V	151	M	F60
Series code	Rated voltage symbol	Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Taping symbol

Standard Ratings

Rated voltage(V) Item	4			6.3			10			16			30			25		
	Case	E.S.R. (mΩ)	Rated ripple current (mA)	Case	E.S.R. (mΩ)	Rated ripple current (mA)	Case	E.S.R. (mΩ)	Rated ripple current (mA)	Case	E.S.R. (mΩ)	Rated ripple current (mA)	Case	E.S.R. (mΩ)	Rated ripple current (mA)	Case	E.S.R. (mΩ)	Rated ripple current (mA)
Rated capacitance(μF)	φ DxL(mm)	(mΩ)	(mA)	φ DxL(mm)	(mΩ)	(mA)	φ DxL(mm)	(mΩ)	(mA)	φ DxL(mm)	(mΩ)	(mA)	φ DxL(mm)	(mΩ)	(mA)	φ DxL(mm)	(mΩ)	(mA)
6.8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6.3x5.7	75	1250
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8x6.7	55	1570
22	—	—	—	—	—	—	—	—	—	—	—	—	6.3x5.7	70	1320	10x7.7	45	2200
27	—	—	—	—	—	—	—	—	—	6.3x5.7	65	1390	6.3x5.7	70	1320	—	—	—
33	—	—	—	—	—	—	—	—	—	6.3x5.7	65	1390	8x6.7	50	1800	—	—	—
39	—	—	—	—	—	—	—	—	—	6.3x5.7	65	1390	8x6.7	50	1800	—	—	—
47	—	—	—	—	—	—	6.3x5.7	55	1510	8x6.7	50	1800	8x6.7	50	1800	—	—	—
56	—	—	—	6.3x5.7	50	1620	6.3x5.7	55	1510	8x6.7	45	1890	10x7.7	40	2400	—	—	—
82	6.3x5.7	50	1620	6.3x5.7	50	1620	8x6.7	40	2120	8x6.7	45	1890	10x7.7	40	2400	—	—	—
100	6.3x5.7	50	1620	6.3x5.7	50	1620	8x6.7	40	2120	10x7.7	35	2670	—	—	—	—	—	—
150	6.3x5.7	50	1620	8x6.7	35	2560	10x7.7	30	3020	10x7.7	35	2670	—	—	—	—	—	—
220	8x6.7	35	2560	10x7.7	25	3700	10x7.7	30	3020	—	—	—	—	—	—	—	—	—
330	8x6.7	35	2560	10x7.7	25	3700	—	—	—	—	—	—	—	—	—	—	—	—
470	10x7.7	25	3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 105°C, 100kHz ; E.S.R. : 20°C, 100kHz

Aluminum Electrolytic Capacitors  
With Conductive Polymer Solid  
Electrolyte

## **Chip Type, Miniature and Large Capacitance Aluminum Electrolytic Capacitors**



## ■ Cautions for Using Aluminum Electrolytic Capacitors

Please read product specifications before using ELNA products.

The following cautions should be observed when using our aluminum electrolytic capacitors to assure their maximum stability and performance. When your application design conditions or operating conditions exceed the limit of the product specification, please contact us. If used under conditions beyond the limit of our specifications, it may cause defects such as short circuit, open circuit, leakage, explosion or combustion.

### ■ Cautions for usage

#### 1. DC electrolytic capacitors are polarized.

- If used with a wrong polarity, it creates an abnormal current resulting in a short circuit or damage to itself. Use DC bipolar electrolytic capacitors for use with uncertain or unknown polarity. DC capacitors cannot be used in AC circuits.

#### 2. Use within the rated voltage.

- If a voltage exceeding the rated voltage is applied, it may cause characteristic deterioration or damage due to the increased leakage current.
- When ripple current is loaded, make sure that the peak value of the ripple voltage does not exceed the rated voltage.

#### 3. Using for power supply circuit.

- While aluminum electrolytic capacitors are operated electrolyte liquid inside dries up and E.S.R. (Equivalent Series Resistance) of the capacitor increases. In case operated longer than rated life time, the capacitance much decreases, tangent of loss angle and E.S.R. much increases. Therefore for some case the sum of bias direct voltage and the peak of ripple voltage is over the rated voltage of the capacitor.
- For any type of circuit, in case the sum of bias direct voltage and the peak of ripple voltage is over the rated voltage of the capacitors or in case the minimum voltage is lower than 0 (zero) volt, the voltage control for the capacitors shall be provided.

#### 4. Do not use in a circuit which requires rapid charging or discharging.

- If used in a circuit requiring rapid charging or discharging, it may cause characteristic deterioration or damage to itself due to the heat generated inside the capacitor. In such cases, contact us for our rapid charging/discharging capacitors.

#### 5. Use within the rated ripple current.

- If applied ripple current exceeds rated ripple current, the life of the capacitor may be shortened, or in an extreme case it gets destroyed due to its internal heat. Use high-ripple type capacitors for such circuits.

#### 6. Changes in characteristics due to operating temperature.

- The characteristics of an electrolytic capacitor will change with a change in the temperature. Such changes are temporary and the original characteristics will be restored at the original temperature (if

the characteristics are not deteriorated by remaining at a high temperature for a long time). If used at a temperature exceeding the guaranteed temperature range, the capacitor may be damaged due to the increased leakage current. Pay attention to the capacitor temperature being affected by the ambient temperature of the unit, the temperature inside the appliance, the heat radiated by another hot component in the unit and the heat inside the capacitor itself due to the ripple current.

- (1)The electrostatic capacitance is normally shown as the value at 20°C-120Hz. It increases as the temperature raises and decreases as it lowers.
- (2)The tangent of loss angle ( $\tan\delta$ ) is normally shown as the value at 20°C-120Hz. It decreases as the ambient temperature gets high and increases as it gets low.
- (3)The leakage current increases as the temperature gets high and decreases as it gets low.

#### 7. Changes in the characteristics due to frequency.

- The characteristics of an electrolytic capacitor will change according to the change in the operating frequency.
  - (1)The electrostatic capacity is normally shown as the value at 20°C-120Hz. It decreases as the frequency increases.
  - (2)The tangent of loss angle ( $\tan\delta$ ) is normally shown as the value at 20°C-120Hz. It increases as the frequency gets high.
  - (3)The impedance is normally shown as the value at 100kHz 20°C. It increases as the frequency lowers.

#### 8. Aluminum electrolytic capacitor life.

- The life of an aluminum electrolytic capacitor terminates when it fails due to the deterioration in its electronic characteristics. Temperature and the ripple current since they especially affect the life. See chart on page.

#### 9. Changes in aluminum electrolytic capacitors during storage.

- After storage for a long period, whether unused of mounted on the appliance, the leakage current of an aluminum electrolytic capacitor will increase. This tendency is more prominent when the ambient temperature is high. If a capacitor has been stored for more than 2 years under normal temperature (shorter if high temperature) and it shows increased leakage current, a treatment by voltage application is recommended. Addition of a protective circuit in

the design of the appliance is also recommended, considering the effect of the initial increased current.

**10. Insulation between the capacitor case and the cathode terminal.**

- The capacitor case and the cathode terminal are connected through the electrolyte which has uncertain resistance. If a complete insulation of the case is necessary, add an insulator at assembly.

**11. External sleeve.**

- During a preheating or a hardening of mounting adhesive may cause a sleeve cracked. The capacitors are usually sleeved with poly vinyl-chloroacrylate or poly ethylene terephthalate for the indication purpose only. Please do not consider it as an insulation.

**12. Fumigation Process**

- When exporting electronic equipment abroad, fumigation process may be performed on wooden packaging material with a halogen (compound) gas such as methyl bromide. Exercise care as this halogen gas may corrode capacitors. Also, use caution to epidemic preventive agent as corrosive component such as halogen may be contained.

**13. Specific Operating Environments**

- Capacitors may corrode when stored or used in a place filled with acidic toxic gases (such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, bromine, methyl bromide, etc.) If capacitors are used or stored in such environments, please let us know.

**14. Use at a high altitude**

- The use of capacitors at high altitudes such as on an airplane causes a large difference between the internal pressure of the capacitors and the atmospheric pressure. However, there is no problem in use under atmospheric pressure up to about an altitude of 10,000 meters. Please check the operation of electronic equipment at the operating environmental temperature because the temperature lowers with increased altitude.

**15. Hole pitch adjustment of the PCB to the capacitors.**

- Set the hole pitch of the PCB to the lead pitch (the "F" distance in the catalog) of the capacitor. Be careful since a short circuit, a cut or an increase in the leakage current etc. may be caused by the stress given to the lead wire terminals due to the difference between the hole pitch and the lead pitch.

**16. Capacitors with pressure valves.**

- A part of the capacitor case is made thin to have the function as the pressure valve in order to pre-

vent explosion due to the rise of inside pressure when a reverse or excessive voltage is applied to the capacitor. Once it has worked as a valve, the whole capacitor needs to be replaced since the valve will not restore.

- When you use a capacitor with pressure valve, provide certain space above the pressure valve as below to prevent an interference when it works as a valve.

Diameter of the capacitor (mm)	18 to less	20 to 40
Required space above the valve(mm)	2.0	3.0

**17. Double-sided PCB's**

- When you use electrolytic capacitors on a double-sided PCB, be careful not to have the circuit pattern run under where the capacitor is mounted. Otherwise it may cause a short circuit on the PCB depending on the condition of mounting.

**18. Regarding to connection of capacitors**

- Aluminum electrolytic capacitor has electrolyte liquid so that the most portion of electric loss characteristics came from E.S.R(Equivalent Series Resistance) of electrolyte liquid. Therefore the capacitor is an electronic device which can flow high ripple current in case the temperature increases and it decreases E.S.R.

In case connecting two capacitors or more, E.S.R. of the capacitors is close to the resistance of the circuit. Therefore in case current is unbalanced and some capacitors has high ripple current, temperature increase, it makes more high current and finally it is over the rated ripple current.

For parallel connection of capacitors the proper design of electric circuit such as balancing of each capacitors resistance or control of total ripple current shall be provided to avoid excess ripple current and voltage.

- When two or more capacitors are arranged in series, the voltage given to each capacitors shall be kept below the rated voltage level, by also giving consideration to the balance of the voltage impressed on the capacitors. Further, partial pressure resistor which considers leakage current shall be provided parallel to each condenser not to have over-voltage impressed on. Balance resistance are explained on p.106 of our Catalog.

**■Cautions for Mounting**

**1. Cautions for mounting.**

- Check the ratings (electrostatic capacitance and rated voltage) of the capacitor before mounting.
- Check the polarity of the capacitor to the chassis.
- Do not drop the capacitor to the floor. Do not use

the dropped capacitor.

- Do not deform the capacitor for mounting.

## 2. Do not apply excessive pressure to the capacitor, its terminals or lead wires.

- Make sure that the contact path of the capacitor meets the hole pitch of the PCB before mounting.
- Transient recovery voltage may be generated in the capacitor due to dielectric absorption. If required, this voltage can be discharged with a resistor with a value of about 1 kΩ.
- A PCB self-standing (snap-in) type capacitor should be pushed to the end (till there is no space) to the PCB for mounting.
- Do not set the automatic insertion machine to clinch the capacitor lead wires too strong.
- Pay attention to the impact given by the component receptacles of the automatic insertion/mounting machines and the product checker, and from the centering operation.

## 3. Soldering.

- Do not dip the capacitor into melted solder.
- The soldering conditions  
Chip type: Please refer to 28 to 29 page.  
small and large type: 260°C, 10 s (max.)  
The preliminary heating and other conditions described in the catalog or product specifications.
- Do not flux other part than the terminals.
- If there is a direct contact between the sleeve of the capacitor and the printed circuit pattern or a metal part of another component such as a lead wire, it may cause shrinkage or crack.
- When you use the capacitor with its sleeve touching directly to the PCB, excessive solder temperature or excessive soldering time may cause the sleeve to shrink or crack during the heat.
- If the application is for extended use, understand and manage the soldering characteristics to avoid abnormal current caused by a contact failure between the capacitor and the PCB.

## 4. Handling after soldering.

- After soldering, do not tilt, push down or twist the capacitor.
- After soldering, do not hold the capacitor as a handle to carry the PCB.
- After soldering, do not hit the capacitor with any obstacle. If PCB's are piled up for storage, the capacitor should not touch another PCB or component.

## 5. Cleaning after Soldering

- Recommended cleaning method  
(1)cleaning solutions:  
(a) CLEANTHROUGH 710M, 750H, 750L  
(b) PINEALPHA ST-100S  
(c) Techno Care FRW-4~17  
(d) Isopropyl alcohol (2-propanol)

(2)Cleaning conditions:

- (a) The temperature of cleaning solution shall be less than 60°C.
- (b) Use immersion or ultrasonic waves within two minutes.
- (c) After cleaning, capacitors and PCB's shall thoroughly be rinsed and dried with hot blast for more than 10 minutes. The temperature of such breeze should be less than the upper category temperature.
- (d) After cleaning, do not keep capacitors in cleaning solution atmosphere or airtight containers.
- During cleaning, control the cleaning solution against contamination.

## 6. Fixing adhesives and coating materials.

- Do not use fixing adhesive or coating material containing halogen-based solvent.
- Before applying the fixing adhesive or the coating material, make sure that there is no remaining flux or stains between the PCB and the sealed part of the capacitor.
- Before applying the fixing adhesive or the coating material, make sure that the detergent etc. has dried up.
- Do not cover the whole surface of the sealed part (terminal side) of the capacitor with the fixing adhesive or the coating material.
- Observe the description in the catalog or the product specifications concerning the thermal stiffening conditions of the fixing adhesive or the coating material. (If there is no such description, contact us.) When both discrete and SMT components are on the same PCB, the fixing material for the SMT components may cause crack, tear or shrinkage on the external sleeve depending on the thermal stiffening condition.
- Recommended fixing adhesives and coating materials  
Fixing adhesives: Cemedine 210,501,540,545N,Diabond DN83K,DA3288,Bond G103  
Coating materials: Taffy TF1159,HumiSeal 1B66,1A27NS

## ■Other Cautions

### 1. Do not touch capacitor terminals with bare hands.

You may get electric shock or your hand may be burnt. Discharge it with a 1 KΩ resistance before use if necessary.

### 2. Do not short the capacitor terminals with a conductor.

Do not spill conductive solution including acid or alkaline solution on the capacitor.

### 3. Periodical inspections should be established for the capacitors used in industrial appliances.

- The following items should be checked:

#### NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.



### Recommended soldering conditions

#### Standard type (Lead free)

##### (1) Methods

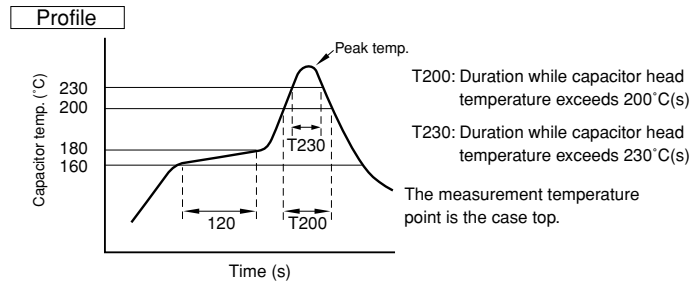
See the following

Methods	Reflow soldering	Soldering iron	Flow soldering
Advisability	○	○	×

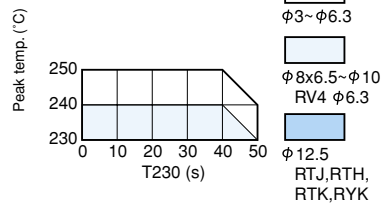
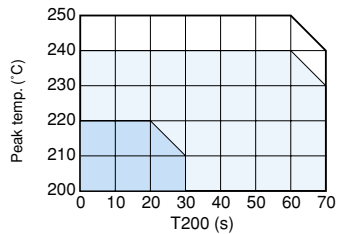
##### (2) Soldering iron conditions

Iron tip temperature shall be  $400^{\circ}\text{C} \pm 5^{\circ}\text{C}$  within the duration of  $3^{+1}_0$  seconds.

##### (3) Reflow soldering conditions



#### Peak temp. matrix

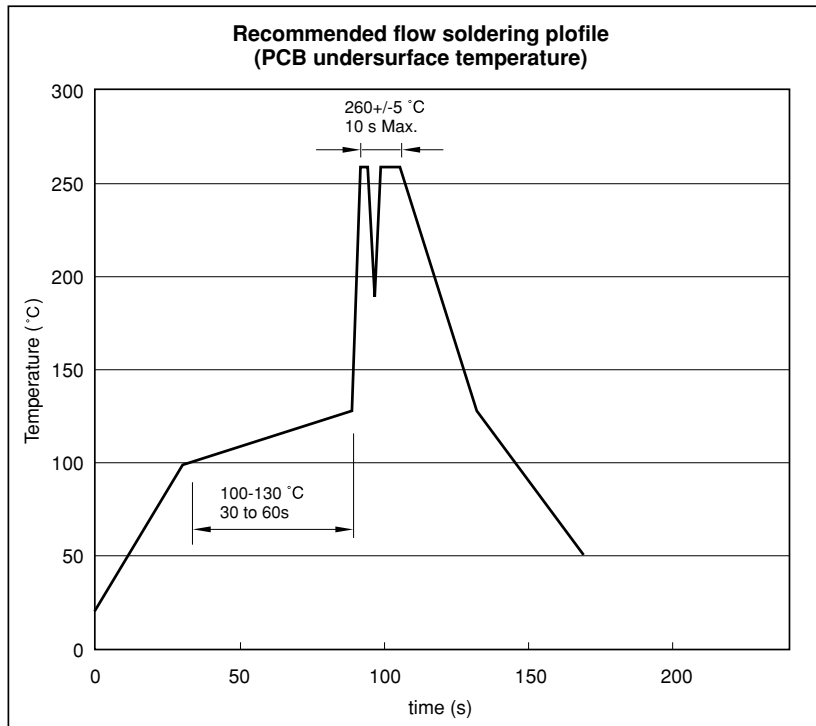


- φ3~φ6.3
- φ8x6.5~φ10  
RV4 φ6.3
- φ12.5  
RTJ,RTH,  
RTK,RYK

1. Preheating shall be under  $180^{\circ}\text{C}$  within 120 seconds.
2. Peak temperature shall be within the peak temperature matrix.
3. For conditions exceeding the tolerances, consult with us.

**Recommended soldering condition (Lead free flow soldering)**

The recommendation soldering conditions of the product in which flow soldering is possible are as graph.

**Caution for Using aluminum Electrolytic Capacitors**

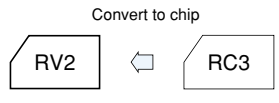
- (1) Do not dip the capacitor into melted solder.
- (2) Do not flux other part than the terminals.
- (3) If there is a direct contact between the sleeve of the capacitor and the printed circuit pattern or a metal part of another component such as a lead wire, it may cause shrinkage or crack.
- (4) If the application is for extended use, understand and manage the soldering characteristics to avoid abnormal current caused by a contact failure between the capacitor and the PCB.
- (5) Please refer to product specifications about other notes.



## Chip Type Standard Capacitors (height:5.5mm)

- GREEN CAP
- SMD
- Anti-cleaning solvent

- Compatible with surface mounting for 5.5mm high capacitors.
- Supplied with carrier taping.
- Guarantees 2000 hours at 85°C.



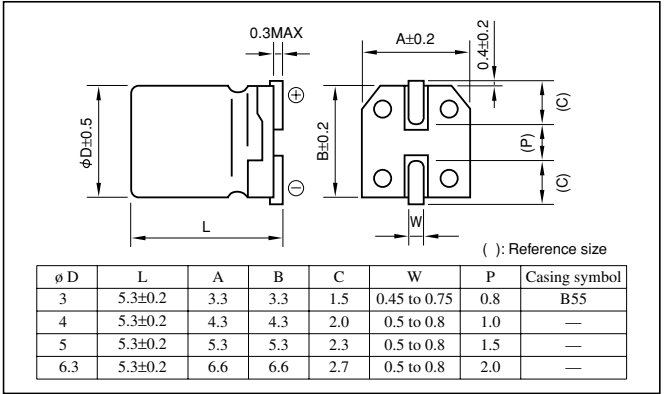
Marking color : Black print

### Specifications

Item	Performance																																
Category temperature range (°C)	-40 to +85																																
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)																																
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)																																
Tangent of loss angle (tanδ)	Rated voltage (V)																																
	<table border="1"> <tr> <th>Rated voltage (V)</th> <th>4</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> </tr> <tr> <td>tanδ (max.)</td> <td>0.42</td> <td>0.30</td> <td>0.24</td> <td>0.22</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> </tr> <tr> <td></td> <td colspan="2">φ 3</td> <td colspan="2">φ 4 to φ 6.3</td> <td colspan="3"></td> </tr> <tr> <td></td> <td>0.42</td> <td>0.28</td> <td>0.24</td> <td>0.20</td> <td>0.14</td> <td>0.12</td> <td>0.10</td> </tr> </table>		Rated voltage (V)	4	6.3	10	16	25	35	50	tanδ (max.)	0.42	0.30	0.24	0.22	0.16	0.14	0.12		φ 3		φ 4 to φ 6.3						0.42	0.28	0.24	0.20	0.14	0.12
Rated voltage (V)	4	6.3	10	16	25	35	50																										
tanδ (max.)	0.42	0.30	0.24	0.22	0.16	0.14	0.12																										
	φ 3		φ 4 to φ 6.3																														
	0.42	0.28	0.24	0.20	0.14	0.12	0.10																										
Characteristics at high and low temperature	Rated voltage (V)		4	6.3	10	16	25	35	50																								
	Impedance ratio (max.)	φ 3	Z-25°C / Z+20°C	7	4	3	2	2	2																								
			Z-40°C / Z+20°C	17	10	8	6	4	3	3																							
		φ 4 to φ 6.3	Z-25°C / Z+20°C	7	3	3	2	2	2	2																							
Z-40°C / Z+20°C			15	8	5	4	3	3	3																								
Endurance (85°C) (Applied ripple current)	Test time		2000 hours (φ 3:1000 hours)																														
	Leakage current		The initial specified value or less																														
	Percentage of capacitance change		Within ±20% of initial value (4WV: ±30%)																														
	Tangent of the loss angle		200% or less of the initial specified value (4WV: 300%)																														
Shelf life (85°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1																																
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)																																

Aluminum Electrolytic Capacitors

### Outline Drawing



### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50 · 60	120	1k	10k · 100k
4 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50	0.80	1	1.35	1.50

### Part numbering system

• φ3 (example: 16V10µF)

RV2 — 16 V 100 M B55 □ U — □

Series code    Rated voltage symbol    Rated capacitance symbol    Capacitance tolerance symbol    Casing symbol    Additional symbol    Taping symbol

• φ4 to φ6.3 (example: 16V47µF)

RV2 — 16 V 470 M □ U — □

Series code    Rated voltage symbol    Rated capacitance symbol    Capacitance tolerance symbol    Additional symbol    Taping symbol

- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

### Standard Ratings

Rated capacitance (µF)	Item	4				6.3				10				16				25				35				50			
		Case φ D(mm)	Casing symbol	ESR Ω	Rated ripple current mArms	Case φ D(mm)	Casing symbol	ESR Ω	Rated ripple current mArms	Case φ D(mm)	Casing symbol	ESR Ω	Rated ripple current mArms	Case φ D(mm)	Casing symbol	ESR Ω	Rated ripple current mArms	Case φ D(mm)	Casing symbol	ESR Ω	Rated ripple current mArms	Case φ D(mm)	Casing symbol	ESR Ω	Rated ripple current mArms				
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
22	3	B55	32	14	4	—	21	31	5	—	18	39	5	—	15	44	6.3	—	11	55	6.3	—	9.1	59	—	—			
33	4	—	21	31	5	—	14	44	5	—	12	48	6.3	—	10	63	6.3	—	7.0	67	—	—	—	—	—	—			
47	4	—	15	37	5	—	10	52	6.3	—	8.5	67	6.3	—	7.1	75	—	—	—	—	—	—	—	—	—	—			
100	5	—	7.0	63	6.3	—	5.0	89	6.3	—	4.0	98	6.3	—	3.3	103	—	—	—	—	—	—	—	—	—	—			
220	6.3	—	3.2	110	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				

(Note) Rated ripple current : 85°C, 120Hz ; ESR : 20°C, 120Hz



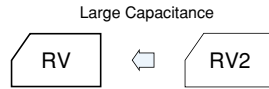
Chip Type Large Capacitance Capacitors

GREEN CAP

SMD

Anti-cleaning solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 2000 hours at 85°C.



Marking color : Black print (ø8x6.5L)  
White print on a brown sleeve (ø8x10L · ø10x10L)

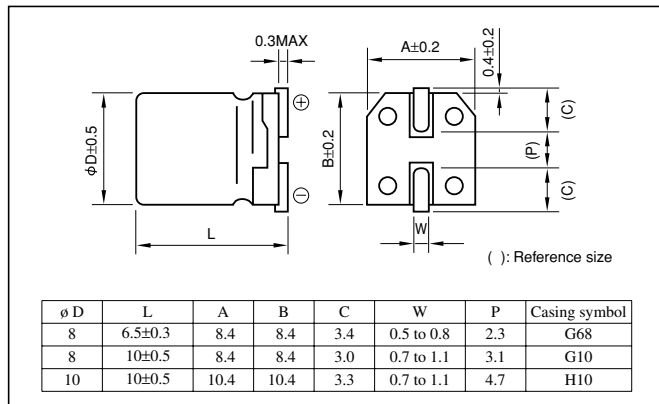
Specifications

Item	Performance									
Category temperature range (°C)	-40 to +85									
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)									
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)									
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	63	100	
	tanδ (max.)	0.28	0.24	0.20	0.14	0.12	0.10	0.10	0.10	(20°C, 120Hz)
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50	63	100	
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2	2	2	2
Endurance (85°C) (Applied ripple current)	Test time	2000 hours								
	Leakage current	The initial specified value or less								
	Percentage of capacitance change	Within ±20% of initial value								
	Tangent of the loss angle	200% or less of the initial specified value								
Shelf life (85°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1									
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)									

Aluminum Electrolytic Capacitors

Outline Drawing

Unit: mm



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50 · 60	120	1k	10k · 100k
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50 to 63	0.80	1	1.35	1.50
100	0.70	1	1.35	1.50

Part numbering system (example: 10V1000µF)

RV	—	10	V	102	M	H10	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Standard Ratings

Rated voltage (V)	6.3			10			16			25			35			50			63			100		
	Case	Casing symbol	Rated ripple current	Case	Casing symbol	Rated ripple current	Case	Casing symbol	Rated ripple current	Case	Casing symbol	Rated ripple current	Case	Casing symbol	Rated ripple current	Case	Casing symbol	Rated ripple current	Case	Casing symbol	Rated ripple current	Case	Casing symbol	Rated ripple current
Rated capacitance (µF)	Ω	mArms	Ω	mArms	Ω	mArms	Ω	mArms	Ω	mArms	Ω	mArms	Ω	mArms	Ω	mArms	Ω	mArms	Ω	mArms	Ω	mArms	Ω	mArms
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
68	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
100	—	—	—	8x6.5	G68	4.0	155	8x6.5	G68	3.3	155	8x6.5	G68	2.3	155	8x10	G10	2.0	252	10x10	H10	1.7	458	—
220	8x6.5	G68	2.1	155	8x6.5	G68	1.8	155	8x10	G10	1.5	252	8x10	G10	1.1	252	10x10	H10	0.91	458	—	—	—	—
330	8x6.5	G68	1.4	155	8x10	G10	1.2	252	8x10	G10	1.0	252	10x10	H10	0.70	458	—	—	—	—	—	—	—	—
470	8x10	G10	0.99	252	10x10	H10	0.85	458	8x10	G10	0.71	252	10x10	H10	0.49	458	—	—	—	—	—	—	—	—
1000	10x10	H10	0.46	458	10x10	H10	0.34	458	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz ; ESR : 20°C, 120Hz



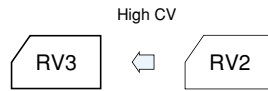
Chip Type 85°C Capacitors (height:5.5mm,8.0mm)

GREEN CAP

SMD

Anti-cleaning solvent

- Compatible with surface mounting for 5.5mm, 8.0mm high capacitors.
- Supplied with carrier taping.
- Guarantees 2000 hours at 85°C.



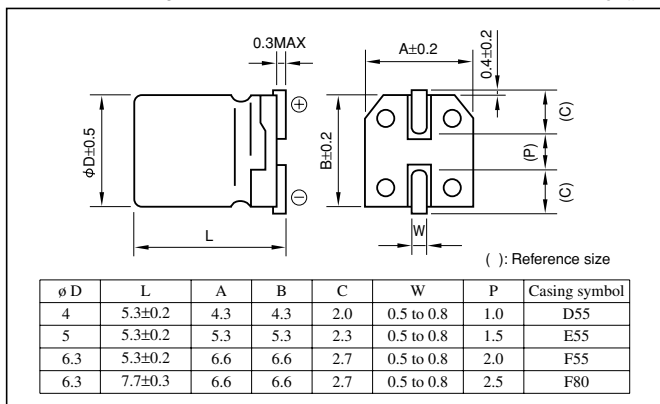
Marking color : Black print

Specifications

Item	Performance							
Category temperature range (°C)	-40 to +85							
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)							
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)							
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	
	tanδ (max.)	0.42	0.32	0.26	0.18	0.14	0.12	
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50	
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2	2
		Z-40°C / Z+20°C	8	8	5	5	4	4
Endurance (85°C) (Applied ripple current)	Test time	2000 hours						
	Leakage current	The initial specified value or less						
	Percentage of capacitance change	Within ±30% of initial value						
	Tangent of the loss angle	300% or less of the initial specified value						
Shelf life (85°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1							
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)							

Aluminum Electrolytic Capacitors

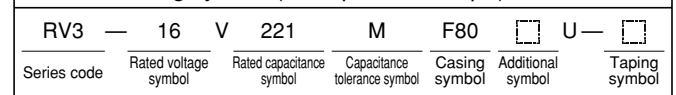
Outline Drawing



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V) \ Frequency(Hz)	50	120	1k	10k · 100k
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50	0.70	1	1.35	1.50

Part numbering system (example: 16V220µF)



- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Standard Ratings

Rated capacitance(µF)	6.3			10			16			25			35			50		
	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current
Item	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4x5.3	42	20
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4x5.3	20	34
22	—	—	—	4x5.3	24	26	4x5.3	20	30	4x5.3	14	43	5x5.3	11	47	6.3x5.3	9.0	59
33	4x5.3	21	28	4x5.3	16	33	5x5.3	13	44	5x5.3	9.0	54	6.3x5.3	7.0	67	6.3x7.7	6.0	82
47	4x5.3	15	34	5x5.3	11	45	5x5.3	9.2	50	6.3x5.3	6.4	75	6.3x7.7	4.9	90	6.3x7.7	4.2	98
68	5x5.3	10	47	5x5.3	7.8	54	6.3x5.3	6.3	74	6.3x5.3	4.4	90	6.3x7.7	3.4	109	—	—	—
100	5x5.3	7.0	58	—	—	—	6.3x5.3	4.3	103	6.3x7.7	3.0	124	—	—	—	—	—	—
150	6.3x5.3	4.6	83	6.3x7.7	3.5	98	6.3x7.7	2.9	109	—	—	—	—	—	—	—	—	—
220	6.3x7.7	3.2	113	6.3x7.7	2.4	130	6.3x7.7	2.0	144	—	—	—	—	—	—	—	—	—
330	6.3x7.7	2.1	139	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz ; ESR : 20°C, 120Hz

## Chip Type 85°C Capacitors (height:4.5mm)

GREEN CAP

SMD

Anti-cleaning solvent

- Compatible with surface mounting for 4.5mm high capacitors.
- Supplied with carrier taping.
- Guarantees 2000 hours at 85°C.



Low Profile



Marking color : Black print

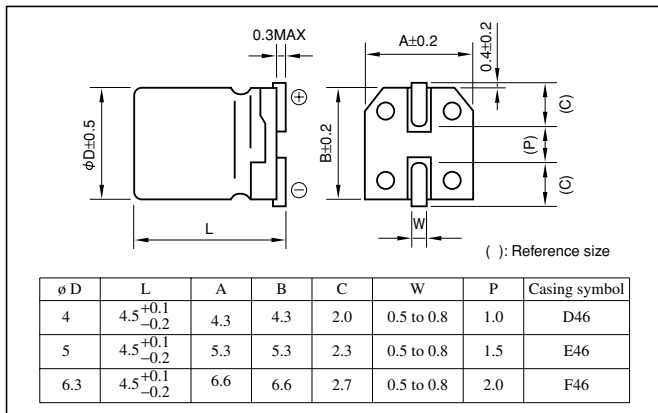
### Specifications

Item	Performance							
Category temperature range (°C)	-40 to +85							
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)							
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)							
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	
	tanδ (max.)	0.30	0.24	0.19	0.16	0.14	0.12	
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50	
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2	2
		Z-40°C / Z+20°C	8	8	4	4	3	3
Endurance (85°C) (Applied ripple current)	Test time	2000 hours						
	Leakage current	The initial specified value or less						
	Percentage of capacitance change	Within ±20% of initial value						
	Tangent of the loss angle	300% or less of the initial specified value						
Shelf life (85°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1							
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)							

Aluminum Electrolytic Capacitors

### Outline Drawing

Unit: mm



### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50 · 60	120	1k	10k · 100k
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.70	1	1.25	1.40
50	0.1 to 3.3µF	0.50	1	1.35
	4.7 to 10µF	0.70	1	1.35

### Part numbering system (example: 6.3V47µF)

RV4	—	6	V	470	M	E46	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol	Taping symbol	

- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

### Standard Ratings

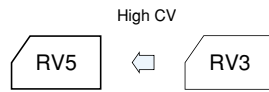
Rated voltage(V)	6.3			10			16			25			35			50		
	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current
Rated capacitance(µF)	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	1990	3
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	905	4
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	603	5
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	423	6
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	199	8
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	90	12
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	60	15
4.7	—	—	—	—	—	—	—	—	—	4	56	17	4	49	18	5	42	21
10	—	—	—	—	—	—	4	32	22	5	27	28	5	23	30	6.3	20	35
22	4	23	26	5	18	34	5	14	38	6.3	12	49	6.3	11	52	—	—	—
33	5	15	37	5	12	42	6.3	10	55	6.3	8	60	—	—	—	—	—	—
47	5	11	45	6.3	8	59	6.3	7	76	—	—	—	—	—	—	—	—	—
100	6.3	5	76	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz ; ESR : 20°C, 120Hz

Chip Type Large Capacitance Capacitors

GREEN CAP SMD Anti-cleaning solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 2000 hours at 85°C.



Marking color : Black print (ø3x5.3L - ø8x10L)  
White print on a brown sleeve (ø10x10L)

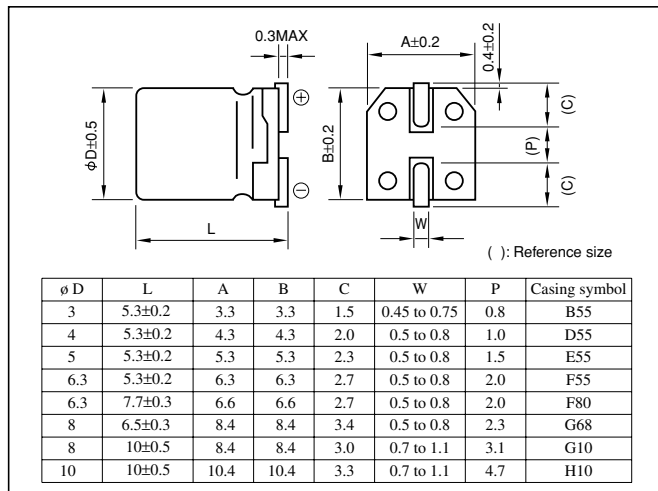
Specifications

Item	Performance									
Category temperature range (°C)	-40 to +85									
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)									
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)									
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	63	100	
	tanδ (max.)	0.35	0.32	0.28	0.18	0.14	0.12	0.12	0.12	(20°C, 120Hz)
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50	63	100	
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2	2	2	2
		Z-40°C / Z+20°C	10	8	6	4	3	3	3	3
Endurance (85°C) (Applied ripple current)	Test time	2000 hours (ø 3:1000 hours)								
	Leakage current	The initial specified value or less								
	Percentage of capacitance change	Within ±30% of initial value								
	Tangent of the loss angle	300% or less of the initial specified value								
Shelf life (85°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1									
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)									

Chip type Aluminum Electrolytic Capacitors

Outline Drawing

Unit: mm



- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50 · 60	120	1k	10k · 100k
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50 to 63	0.80	1	1.35	1.50
100	0.70	1	1.35	1.50

Part numbering system (example: 16V470µF)

RV5	—	16	V	471	M	G10	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

• The standard ratings are described on the next page.

### Standard Ratings

Rated voltage (V)	6.3			10			16			25			35			50			63			100		
	Case	Casing symbol	Rated ripple current mArms	Case	Casing symbol	Rated ripple current mArms	Case	Casing symbol	Rated ripple current mArms	Case	Casing symbol	Rated ripple current mArms	Case	Casing symbol	Rated ripple current mArms	Case	Casing symbol	Rated ripple current mArms	Case	Casing symbol	Rated ripple current mArms	Case	Casing symbol	Rated ripple current mArms
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3x5.3	B55	7	—	—	—
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3x5.3	B55	10	4x5.3	D55	12	—	—	—
4.7	—	—	—	—	—	—	—	—	—	—	—	—	3x5.3	B55	13	4x5.3	D55	18	5x5.3	E55	20	—	—	—
10	—	—	—	—	—	—	3x5.3	B55	18	3x5.3	B55	16	4x5.3	D55	24	5x5.3	E55	30	6.3x5.3	F55	32	—	—	—
22	3x5.3	B55	21	3x5.3	B55	20	—	—	—	4x5.3	D55	24	5x5.3	E55	41	6.3x5.3	F55	47	6.3x7.7	F80	60	—	—	—
																			8x6.5	G68	62	—	—	—
33	—	—	—	—	—	—	4x5.3	D55	32	5x5.3	E55	47	—	—	—	8x6.5	G68	83	—	—	—	8x10	G10	94
47	4x5.3	D55	34	4x5.3	D55	33	5x5.3	E55	52	—	—	—	6.3x5.3	F55	54	6.3x7.7	F80	85	8x10	G10	139	10x10	H10	189
100	5x5.3	E55	55	5x5.3	E55	54	6.3x5.3	F55	70	6.3x7.7	F80	120	6.3x7.7	F80	120	8x10	G10	252	10x10	H10	226	—	—	—
150	—	—	—	6.3x5.3	F55	79	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
220	6.3x5.3	F55	88	6.3x7.7	F80	173	6.3x7.7	F80	162	—	—	—	8x10	G10	260	—	—	—	—	—	—	—	—	—
				8x6.5	G68	175	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
330	6.3x7.7	F80	188	—	—	—	—	—	—	8x10	G10	300	10x10	H10	360	—	—	—	—	—	—	—	—	—
	8x6.5	G68	190	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
470	—	—	—	8x10	G10	310	8x10	G10	307	10x10	H10	400	—	—	—	—	—	—	—	—	—	—	—	—
680	—	—	—	—	—	—	10x10	H10	380	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
820	8x10	G10	320	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1000	—	—	—	10x10	H10	454	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1500	10x10	H10	489	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

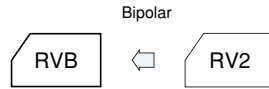
(Note) Rated ripple current : 85°C, 120Hz

Chip type Aluminum Electrolytic Capacitors

Chip Type Bipolar Capacitors (height:5.5mm)

GREEN CAP SMD Anti-cleaning solvent

- Compatible with surface mounting for 5.5mm high capacitors.
- Supplied with carrier taping.
- Guarantees 2000 hours at 85°C.



Marking color : Black print

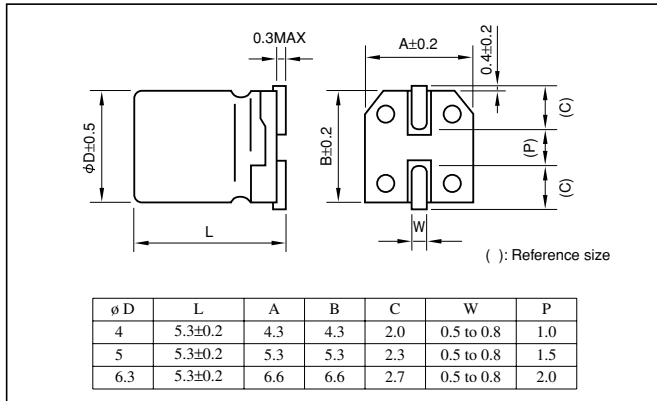
Specifications

Item	Performance							
Category temperature range (°C)	-40 to +85							
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)							
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)							
Tangent of loss angle (tanδ)	Rated voltage (V)		6.3	10	16	25	35	50
	tanδ (max.)	φ 4	0.35	0.30	0.25	0.25	0.25	0.25
		φ 5, 6.3	0.30	0.25	0.20	0.15	0.15	0.15
Characteristics at high and low temperature	Rated voltage (V)		6.3	10	16	25	35	50
	Impedance ratio (max.)	Z-25°C / Z+20°C	3	3	2	2	2	2
		Z-40°C / Z+20°C	8	5	4	3	3	3
Endurance (85°C) (Applied ripple current)	Test time		2000 hours (with the polarity inverted every 250 hours)					
	Leakage current		The initial specified value or less					
	Percentage of capacitance change		Within ±20% of initial value					
	Tangent of the loss angle		200% or less of the initial specified value					
Shelf life (85°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1							
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)							

Aluminum Electrolytic Capacitors Chip type

Outline Drawing

Unit: mm

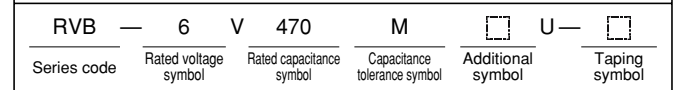


- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50	120	1k	10k · 100k
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50	0.80	1	1.35	1.50

Part numbering system (example: 6.3V47µF)



Standard Ratings

Rated capacitance(µF)	6.3			10			16			25			35			50		
	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current
Item	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	3320	2.3
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	1510	3.3
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	1010	4.1
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	706	4.9
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	332	7.2
2.2	—	—	—	—	—	—	—	—	—	—	—	—	4	151	10	5	113	14
3.3	—	—	—	—	—	—	—	—	—	4	101	13	5	75	17	5	75	17
4.7	—	—	—	—	—	—	4	88	14	5	53	20	5	53	21	6.3	53	24
10	—	—	—	4	50	18	5	33	26	6.3	25	35	6.3	25	35	—	—	—
22	5	23	27	6.3	19	40	6.3	15	45	—	—	—	—	—	—	—	—	—
33	6.3	15	45	6.3	13	50	6.3	10	55	—	—	—	—	—	—	—	—	—
47	6.3	11	54	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz ; ESR : 20°C, 120Hz

## Chip Type 105°C Capacitors (height:5.5mm)

GREEN CAP

SMD

105°C  
1000hours

Anti-cleaning solvent

- Compatible with surface mounting for 5.5mm high capacitors.
- Supplied with carrier taping.
- Guarantees 1000 hours at 105°C.

RVS

High temperature

RV2



Marking color : Black print

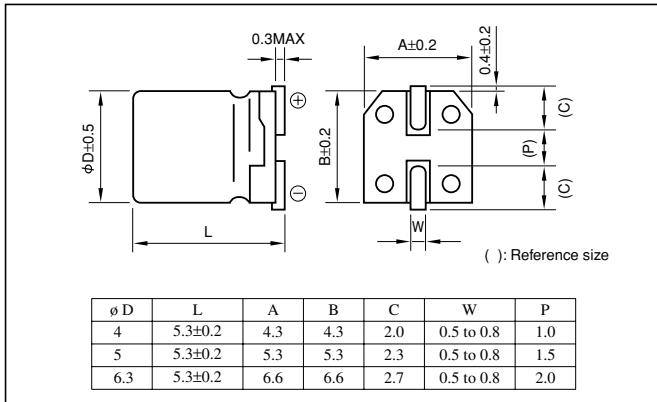
### Specifications

Item	Performance						
Category temperature range (°C)	-55 to +105						
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)						
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)						
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50
	tanδ (max.)	0.30	0.26	0.22	0.16	0.13	0.12
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2
		Z-40°C / Z+20°C	8	5	4	3	3
Endurance (105°C) (Applied ripple current)	Test time	1000 hours					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±20% of initial value					
	Tangent of the loss angle	200% or less of the initial specified value					
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1						
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)						

Chip type Aluminum Electrolytic Capacitors

### Outline Drawing

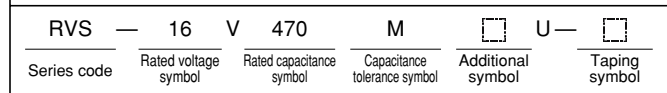
Unit: mm



### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50 · 60	120	1k	10k · 100k
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50	0.80	1	1.35	1.50

### Part numbering system (example: 16V47µF)



- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

### Standard Ratings

Rated capacitance(µF)	Rated voltage(V)			6.3			10			16			25			35			50		
	Item	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current		
	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms			
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
10	—	—	—	4	43	15	4	36	16	5	27	21	4	46	14	5	22	23	6.3	20	26
22	4	23	21	5	20	25	5	17	28	6.3	12	36	6.3	10	50	—	—	—	—	—	—
33	5	15	30	5	13	31	6.3	11	40	6.3	8.0	44	—	—	—	—	—	—	—	—	—
47	5	11	36	6.3	9.2	43	6.3	7.8	47	—	—	—	—	—	—	—	—	—	—	—	—
100	6.3	5.0	61	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 105°C, 120Hz ; ESR : 20°C, 120Hz



Chip Type 105°C Capacitors (height:6.0mm)

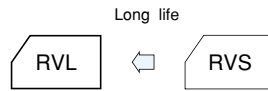
GREEN CAP

SMD

105°C  
2000hours

Anti-  
cleaning  
solvent

- Compatible with surface mounting for 6.0mm high capacitors.
- Supplied with carrier taping.
- Guarantees 2000 hours at 105°C.



Marking color : Black print

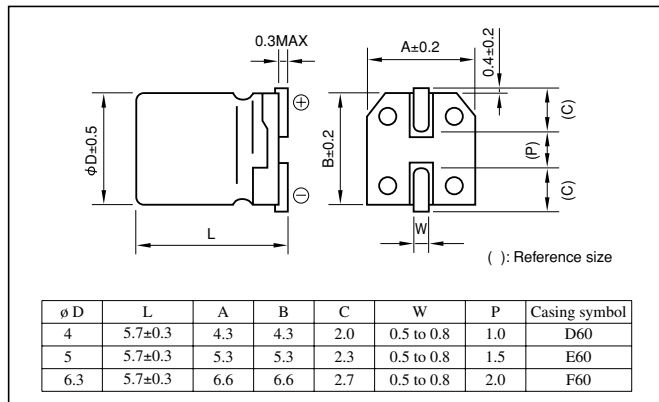
Specifications

Item	Performance						
Category temperature range (°C)	-55 to +105						
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)						
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)						
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50
	tanδ (max.)	0.32	0.28	0.24	0.18	0.15	0.14
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2
Endurance (105°C) (Applied ripple current)	Test time	2000 hours					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±30% of initial value					
	Tangent of the loss angle	300% or less of the initial specified value					
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1						
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)						

Aluminum Electrolytic Capacitors

Outline Drawing

Unit: mm



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50 · 60	120	1k	10k · 100k
6.3 to 16	0.8	1	1.15	1.25
25 · 35	0.8	1	1.25	1.40
50	0.1 to 3.3µF	0.5	1	1.35
	4.7 to 10µF	0.7	1	1.35

Part numbering system (example: 16V470 M F60 U)

RVL	—	16	V	470	M	F60	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Standard Ratings

Rated capacitance(µF)	Item	6.3			10			16			25			35			50		
		Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current
		φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	2321	4
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	1055	5
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	703	6
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	494	7
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	232	12
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	105	19
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	70	22
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	49	29
10	—	—	—	—	—	—	—	4	40	27	5	30	36	5	25	39	6.3	23	47
22	—	—	—	—	—	—	—	5	18	46	6.3	14	62	6.3	11	65	—	—	—
33	—	—	—	—	—	—	—	6.3	12	66	6.3	9.0	76	—	—	—	—	—	—
47	—	—	—	—	6.3	9.9	74	6.3	8.5	78	—	—	—	—	—	—	—	—	—
100	—	6.3	5.3	99	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 105°C, 120Hz ; ESR : 20°C, 120Hz

## Chip Type, 105°C Use, Large Capacitance Capacitors

GREEN CAP

SMD

105°C  
2000hours

Anti-cleaning solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 2000 hours at 105°C.



High temperature



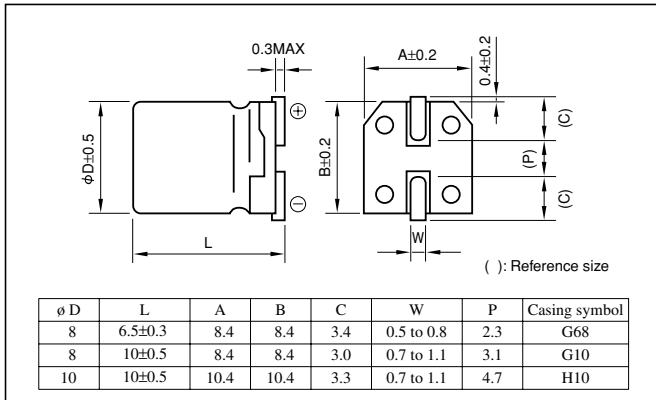
Marking color : Black print (ø8x6.5L)  
White print on a brown sleeve (ø8x10L · ø10x10L)

### Specifications

Item	Performance										
Category temperature range (°C)	-55 to +105										
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)										
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)										
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	63	100		
	tanδ (max.)	0.30	0.24	0.22	0.16	0.13	0.12	0.11	0.10	(20°C, 120Hz)	
Characteristics at high and low temperature	Impedance ratio (max.)	Rated voltage (V)		6.3	10	16	25	35	50	63	100
		Z-25°C / Z+20°C	4	3	2	2	2	2	2	2	(120Hz)
		Z-40°C / Z+20°C		8	5	4	3	3	3	3	3
Endurance (105°C) (Applied ripple current)	Test time	2000 hours									
	Leakage current	The initial specified value or less									
	Percentage of capacitance change	Within ±20% of initial value									
	Tangent of the loss angle	200% or less of the initial specified value									
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1										
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)										

### Outline Drawing

Unit: mm



- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50 · 60	120	1k	10k · 100k
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50 to 63	0.80	1	1.35	1.50
100	0.70	1	1.35	1.50

### Part numbering system (example: 16V470µF)

RVJ	—	16	V	471	M	H10	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

### Standard Ratings

Rated voltage (V)	6.3				10				16				25				35				50				63				100			
	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current				
Rated capacitance (µF)	φ D(mm)		Ω	mArms	φ D(mm)		Ω	mArms	φ D(mm)		Ω	mArms	φ D(mm)		Ω	mArms	φ D(mm)		Ω	mArms	φ D(mm)		Ω	mArms	φ D(mm)		Ω	mArms	φ D(mm)		Ω	mArms
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
100	—	—	—	—	8x6.5	G68	4.3	110	8x6.5	G68	3.6	110	8x10	G10	2.7	178	10x10	H10	2.2	324	8x10	G10	2.0	178	10x10	H10	2.0	324	—	—	—	
220	8x10	G10	2.3	178	8x10	G10	2.0	178	10x10	H10	1.7	324	10x10	H10	1.2	324	10x10	H10	0.98	324	—	—	—	—	—	—	—	—	—	—	—	
330	8x10	G10	1.5	178	10x10	H10	1.3	324	10x10	H10	1.1	324	10x10	H10	0.80	324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
470	10x10	H10	1.0	324	10x10	H10	0.92	324	10x10	H10	0.78	324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
1000	10x10	H10	0.50	324	10x10	H10	0.40	324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

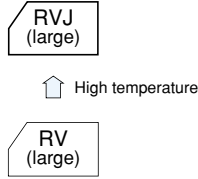
(Note) Rated ripple current : 105°C, 120Hz ; ESR : 20°C, 120Hz

Chip type  
Aluminum Electrolytic Capacitors

Chip Type, 105°C Use, Large Capacitance Capacitors

SMD 105°C 5000hours Anti-cleaning solvent

- Surface mount device.
- Supplied with taping.
- Guarantees 5000 hours at 105°C.



Marking color : White print on a brown sleeve

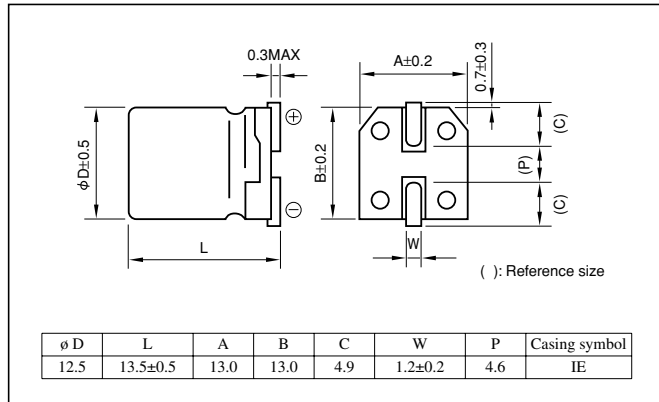
Specifications

Item	Performance									
Category temperature range (°C)	-55 to +105									
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)									
Leakage current (µA)	Less than 0.01CV (after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)									
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	63	100	
	tanδ (max.)	0.30	0.26	0.22	0.16	0.13	0.12	0.11	0.10	
0.02 is added to every 1000µF increase over 1000µF. (20°C, 120Hz)										
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50	63	100	
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2	2	2	2
Z-40°C / Z+20°C 8 5 4 3 3 3 3 3 3 (120Hz)										
Endurance (105°C) (Applied ripple current)	Test time	5000 hours								
	Leakage current	The initial specified value or less								
	Percentage of capacitance change	Within ±20% of initial value								
	Tangent of the loss angle	200% or less of the initial specified value								
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1									
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)									

Aluminum Electrolytic Capacitors Chip type

Outline Drawing

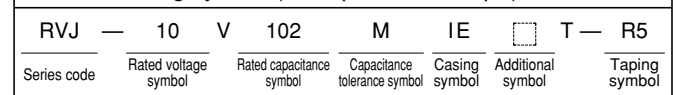
Unit: mm



Coefficient of Frequency for Rated Ripple Current

Rated capacitance(µF) \ Frequency(Hz)	120	1k	10k	100k
47	0.50	0.76	0.87	1
100 to 220	0.70	0.85	0.90	1
330 to 1000	0.80	0.93	0.98	1

Part numbering system (example: 10V100µF)



- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Standard Ratings

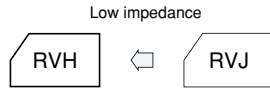
Rated voltage (V) \ Item	6.3				10				16				25				35				50				63				100			
	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current	Case	Casing symbol	Imp.	Rated ripple current				
Rated capacitance (µF)	φ D(mm)	Symbol	Ω	mArms	φ D(mm)	Symbol	Ω	mArms	φ D(mm)	Symbol	Ω	mArms	φ D(mm)	Symbol	Ω	mArms	φ D(mm)	Symbol	Ω	mArms	φ D(mm)	Symbol	Ω	mArms	φ D(mm)	Symbol	Ω	mArms				
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
220	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
330	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
470	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
1000	12.5x13.5	IE	0.105	747	12.5x13.5	IE	0.105	747	12.5x13.5	IE	0.105	747	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				

(Note) Rated ripple current : 105°C, 100kHz ; Impedance(Imp.) : 20°C, 100kHz

## Chip Type, 105°C Use, Low Impedance Capacitors

GREEN CAP   SMD   Low Impedance   105°C 2000hours   Anti-cleaning solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 2000 hours at 105°C.



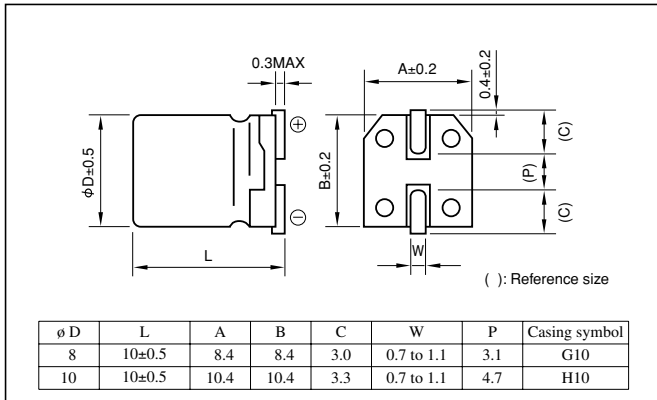
Marking color : White print on a brown sleeve

### Specifications

Item	Performance						
Category temperature range (°C)	-55 to +105						
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)						
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)						
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	
	tanδ (max.)	0.30	0.26	0.22	0.16	0.13	
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2
		Z-40°C / Z+20°C	8	5	4	3	3
Endurance (105°C) (Applied ripple current)	Test time	2000 hours					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±20% of initial value					
	Tangent of the loss angle	200% or less of the initial specified value					
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1						
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)						

### Outline Drawing

Unit: mm



- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

### Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	50 - 60	120	1k	10k - 100k
Coefficient	0.64	0.8	0.93	1

### Part numbering system (example: 16V330µF)

RVH	—	16	V	331	M	H10	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

### Standard Ratings

Rated voltage (V)	6.3				10				16				25				35			
	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current
Rated capacitance (µF)	φ D(mm)		Ω	mArms	φ D(mm)		Ω	mArms	φ D(mm)		Ω	mArms	φ D(mm)		Ω	mArms	φ D(mm)		Ω	mArms
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8x10	G10	0.45	369
100	—	—	—	—	—	—	—	—	—	—	—	—	8x10	G10	0.45	369	10x10	H10	0.25	553
220	—	—	—	—	8x10	G10	0.45	369	—	—	—	—	10x10	H10	0.25	553	—	—	—	—
330	8x10	G10	0.45	369	—	—	—	—	10x10	H10	0.25	553	—	—	—	—	—	—	—	—
470	—	—	—	—	10x10	H10	0.25	553	—	—	—	—	—	—	—	—	—	—	—	—

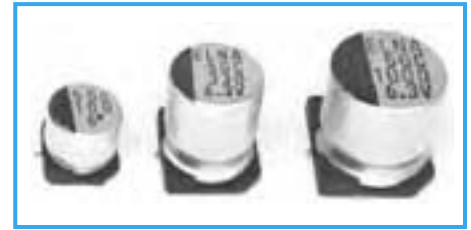
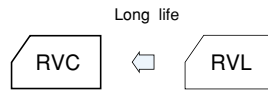
(Note) Rated ripple current : 105°C, 100kHz ; Impedance : 20°C, 100kHz

Chip type Aluminum Electrolytic Capacitors

Chip Type, 105°C Use, Long Life Capacitors

GREEN CAP SMD 105°C 3000hours Anti-cleaning solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 3000 hours at 105°C. (10L:5000 hours).



Marking color : Black print

Specifications

Item	Performance						
Category temperature range (°C)	-40 to +105						
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)						
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(mF), V:Rated voltage(V) (20°C)						
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50
	tanδ (max.)	0.28	0.24	0.20	0.16	0.13	0.12
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2
		Z-40°C / Z+20°C	10	7	5	3	3
Endurance (105°C)	Test time	3000 hours(10L:5000 hours)					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±30% of initial value					
	Tangent of the loss angle	300% or less of initial specified value					
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1						
Applicable standards	JIS C5101-1, -18 1998(IEC 60384-1 1992, -18 1993)						

Chip type Aluminum Electrolytic Capacitors

Outline Drawing

Unit: mm

φD	L	A	B	C	W	P	Casing symbol
4	5.8±0.3	4.3	4.3	2.0	0.5 to 0.8	1.0	D61
5	5.8±0.3	5.3	5.3	2.3	0.5 to 0.8	1.5	E61
6.3	5.8±0.3	6.6	6.6	2.7	0.5 to 0.8	2.0	F61
6.3	7.7±0.3	6.6	6.6	2.7	0.5 to 0.8	2.0	F80
8	6.5±0.5	8.4	8.4	3.4	0.5 to 0.8	2.3	G68
8	10.0±0.5	8.4	8.4	3.0	0.7 to 1.1	3.1	G10
10	10.0±0.5	10.4	10.4	3.3	0.7 to 1.1	4.7	H10

- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50	120	1k	10k · 100k
6.3 to 16	0.8	1	1.15	1.25
25 to 35	0.8	1	1.25	1.40
50	0.1 to 3.3µF	0.5	1	1.35
	4.7µF to	0.7	1	1.35

Part numbering system (example: 16V470M F61 U)

RVC	—	16	V	470	M	F61	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

• The standard ratings are described on the next page.

## Standard Ratings

Rated voltage(V) Rated capacitance(μF)	Item	6.3			10			16			25			35			50		
		Case	Casing	Rated ripple	Case	Casing	Rated ripple	Case	Casing	Rated ripple	Case	Casing	Rated ripple	Case	Casing	Rated ripple	Case	Casing	Rated ripple
		ø D(mm)	symbol	mArms	ø D(mm)	symbol	mArms	ø D(mm)	symbol	mArms	ø D(mm)	symbol	mArms	ø D(mm)	symbol	mArms	ø D(mm)	symbol	mArms
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4x5.8	D61	1.0	
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4x5.8	D61	2.6	
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4x5.8	D61	3.2	
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4x5.8	D61	5.0	
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4x5.8	D61	10	
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4x5.8	D61	16	
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4x5.8	D61	17	
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4x5.8	D61	23	
10	—	—	—	—	—	—	4x5.8	D61	28	—	—	—	5x5.8	E61	28	6.3x5.8	F61	35	
22	4x5.8	D61	26	—	—	—	5x5.8	E61	39	—	—	—	6.3x5.8	F61	55	6.3x7.7	F80	58	
33	—	—	—	5x5.8	E61	43	—	—	—	6.3x5.8	F61	60	6.3x7.7	F80	57	8x10	G10	91	
47	5x5.8	E61	46	—	—	—	6.3x5.8	F61	70	6.3x7.7	F80	65	—	—	—	8x10	G10	100	
100	6.3x5.8	F61	71	—	—	—	6.3x7.7	F80	81	8x10	G10	130	—	—	—	10x10	H10	160	
220	6.3x7.7	F80	101	8x10	G10	160	—	—	—	—	—	—	10x10	H10	220	—	—	—	
330	8x10	G10	230	—	—	—	—	—	—	10x10	H10	238	—	—	—	—	—	—	
470	—	—	—	—	—	—	10x10	H10	340	—	—	—	—	—	—	—	—	—	
1000	10x10	H10	313	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

(Note) Rated ripple current : 105°C, 120Hz

Chip Type, 105°C Use, Long Life Capacitors

GREEN CAP

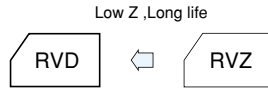
SMD

Low Z

105°C 2000hours

Anti-cleaning solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 2000 hours at 105°C. (10.5L:5000 hours).



Marking color : Black print

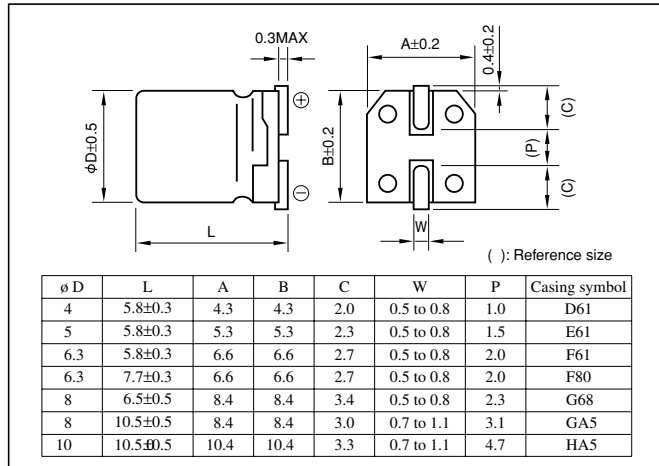
Specifications

Item	Performance							
Category temperature range (°C)	-55 to +105							
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)							
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(mF), V: Rated voltage(V) (20°C)							
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	
	tanδ (max.)	0.26	0.19	0.16	0.14	0.12	0.10	
Characteristics at high and low temperature	Impedance ratio (max.)	Z-25°C / Z+20°C	2	2	2	2	2	2
		Z-40°C / Z+20°C	3	3	3	3	3	3
		Z-55°C / Z+20°C	8	4	4	3	3	3
Endurance (105°C)	Test time	2000 hours(10.5L:5000 hours)						
	Leakage current	The initial specified value or less						
	Percentage of capacitance change	Within ±30% of initial value						
	Tangent of the loss angle	200% or less of initial specified value (10.5L:300% or less)						
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1							
Applicable standards	JIS C5101-1, -18 1998(IEC 60384-1 1992, -18 1993)							

Chip type Aluminum Electrolytic Capacitors

Outline Drawing

Unit: mm



- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Coefficient of Frequency for Rated Ripple Current

Frequency(Hz)	50	120	1k	10k-100k
Rated voltage(V)	50	120	1k	10k-100k
6.3 ~ 50	0.5	0.5	0.75	1

Part numbering system (example: 16V100µF)

RVD	—	16	V	101	M	F61	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

• The standard ratings are described on the next page.

### Standard Ratings

Rated voltage (V)	Item	6.3				10				16				25				35				50						
		Case øDxL (mm)	Casing symbol	Impedance Ω	Rated ripple current mArms	Case øDxL (mm)	Casing symbol	Impedance Ω	Rated ripple current mArms	Case øDxL (mm)	Casing symbol	Impedance Ω	Rated ripple current mArms	Case øDxL (mm)	Casing symbol	Impedance Ω	Rated ripple current mArms	Case øDxL (mm)	Casing symbol	Impedance Ω	Rated ripple current mArms	Case øDxL (mm)	Casing symbol	Impedance Ω	Rated ripple current mArms			
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
22	4x5.8	D61	1.35	90	4x5.8	D61	1.35	90	4x5.8	D61	1.35	90	4x5.8	D61	1.35	90	4x5.8	D61	1.35	90	4x5.8	D61	1.35	90	4x5.8	D61	1.35	90
	5x5.8	E61	0.70	170	5x5.8	E61	0.70	170	5x5.8	E61	0.70	170	5x5.8	E61	0.70	170	5x5.8	E61	0.70	170	5x5.8	E61	0.70	170	5x5.8	E61	0.70	170
33	—	—	—	—	4x5.8	D61	1.35	90	—	—	—	—	5x5.8	E61	0.70	170	—	—	—	—	6.3x5.8	F61	0.36	250	—	—	—	—
	5x5.8	E61	0.70	170	5x5.8	E61	0.70	170	—	—	—	—	6.3x5.8	F61	0.36	250	—	—	—	—	6.3x5.8	F61	0.36	250	6.3x7.7	F80	0.66	195
47	4x5.8	D61	1.35	90	—	—	—	—	5x5.8	E61	0.70	170	—	—	—	—	6.3x5.8	F61	0.36	250	6.3x5.8	F61	0.36	250	6.3x7.7	F80	0.66	195
	5x5.8	E61	0.70	170	—	—	—	—	6.3x5.8	F61	0.36	250	—	—	—	—	6.3x7.7	F80	0.30	300	6.3x7.7	F80	0.30	300	8x6.5	G68	0.63	200
100	6.3x5.8	F61	0.36	250	—	—	—	—	6.3x5.8	F61	0.36	250	6.3x7.7	F80	0.30	300	6.3x7.7	F80	0.30	300	8x10.5	GA5	0.16	600	8x10.5	GA5	0.16	600
220	6.3x5.8	F61	0.36	250	6.3x7.7	F80	0.30	300	6.3x7.7	F80	0.30	300	8x10.5	GA5	0.16	600	8x10.5	GA5	0.16	600	8x10.5	GA5	0.16	600	10x10.5	HA5	0.18	700
	8x6.5	G68	0.30	300	8x10.5	GA5	0.16	600	8x6.5	G68	0.30	300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
330	6.3x7.7	F80	0.30	300	—	—	—	—	8x10.5	GA5	0.16	600	8x10.5	GA5	0.16	600	10x10.5	HA5	0.08	850	—	—	—	—	—	—	—	—
	8x6.5	G68	0.30	300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
470	8x10.5	GA5	0.16	600	8x10.5	GA5	0.16	600	8x10.5	GA5	0.16	600	10x10.5	HA5	0.08	850	—	—	—	—	—	—	—	—	—	—	—	—
680	—	—	—	—	8x10.5	GA5	0.16	600	10x10.5	HA5	0.08	850	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1000	8x10.5	GA5	0.16	600	10x10.5	HA5	0.08	850	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
1500	10x10.5	HA5	0.08	850	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

(Note) Impedance : 20°C, 100kHz  
 Rated ripple current : 105°C, 100kHz



Chip Type, 105°C Use, Low Impedance Capacitors

GREEN CAP

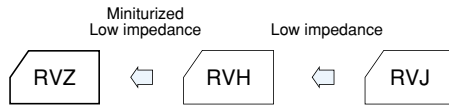
SMD

Low Impedance

105°C 2000hours

Anti-cleaning solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 2000 hours at 105°C.



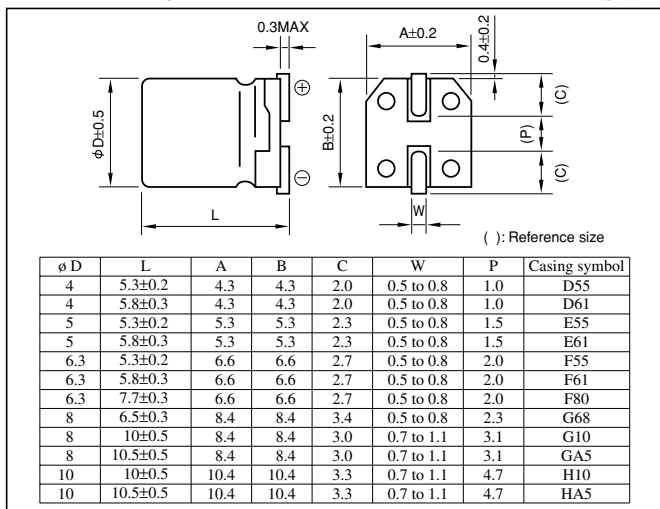
Marking color : Black print (ø4x5.3L – ø8x6.5L)  
White print on a brown sleeve (ø8x10L · ø10x10L)

Specifications

Item	Performance						
Category temperature range (°C)	-55 to +105						
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)						
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)						
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	
	tanδ (max.)	0.28	0.24	0.20	0.16	0.14	
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2
		Z-55°C / Z+20°C	8	5	4	3	3
Endurance (105°C) (Applied ripple current)	Test time	2000 hours (8x6.5 or less: 1000 hours)					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±25% of initial value					
	Tangent of the loss angle	200% or less of the initial specified value					
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1						
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)						

Chip type Aluminum Electrolytic Capacitors

Outline Drawing



- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Coefficient of Frequency for Rated Ripple Current

Frequency(Hz)	120	1k	10k	100k
Rated voltage(V)				
6.3 to 35	0.5	0.75	0.9	1.0

Part numbering system (example: 6.3V1500µF)

RVZ	—	6	V	152	M	HA5	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

• The standard ratings are described on the next page.

### Standard Ratings

Rated voltage (V)	Item	6.3				10				16				25				35			
		Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current
		∅ D(mm)		Ω	mArms	∅ D(mm)		Ω	mArms	∅ D(mm)		Ω	mArms	∅ D(mm)		Ω	mArms	∅ D(mm)		Ω	mArms
4.7	—	—	—	—	—	—	—	—	—	—	—	—	4x5.3	D55	3.20	65	4x5.3	D55	3.20	65	
10	—	—	—	—	4x5.3	D55	3.20	65	4x5.3	D55	3.20	65	4x5.8	D61	1.80	80	5x5.3	E55	1.50	110	
													5x5.3	E55	1.50	110	5x5.8	E61	0.76	150	
15	—	—	—	—	—	—	—	—	4x5.8	D61	1.80	80	5x5.8	E61	0.76	150	5x5.8	E61	0.76	150	
22	4x5.3	D55	3.20	65	4x5.8	D61	1.80	80	5x5.3	E55	1.50	110	5x5.8	E61	0.76	150	6.3x5.3	F55	0.85	170	
	4x5.8	D61	1.80	80	5x5.3	E55	1.50	110	5x5.8	E61	0.76	150	6.3x5.3	F55	0.85	170	6.3x5.3	F55	0.85	170	
33	5x5.3	E55	1.50	110	5x5.3	E55	1.50	110	6.3x5.3	F55	0.85	170	6.3x5.3	F55	0.85	170	6.3x5.3	F55	0.85	170	
	5x5.8	E61	0.76	150	5x5.8	E61	0.76	150	6.3x5.8	F61	0.44	230	6.3x5.8	F61	0.44	230	6.3x5.8	F61	0.44	230	
47	5x5.3	E55	1.50	110	6.3x5.3	F55	0.85	170	6.3x5.3	F55	0.85	170	6.3x5.3	F55	0.85	170	6.3x5.8	F61	0.44	230	
	5x5.8	E61	0.76	150	6.3x5.8	F61	0.44	230	6.3x5.8	F61	0.44	230	6.3x5.8	F61	0.44	230	6.3x7.7	F80	0.34	280	
																	8x6.5	G68	0.34	280	
68	6.3x5.8	F61	0.44	230	6.3x5.8	F61	0.44	230	6.3x5.8	F61	0.44	230	6.3x5.8	F61	0.44	230	6.3x7.7	F80	0.34	280	
																	8x6.5	G68	0.34	280	
100	6.3x5.3	F55	0.85	170	6.3x5.3	F55	0.85	170	6.3x5.3	F55	0.85	170	6.3x7.7	F80	0.34	280	6.3x5.8	F61	0.44	230	
	6.3x5.8	F61	0.44	230	6.3x5.8	F61	0.44	230	6.3x5.8	F61	0.44	230	8x6.5	G68	0.34	280	8x6.5	G68	0.34	280	
																	8x10.5	GA5	0.17	450	
150	6.3x5.8	F61	0.44	230	6.3x5.8	F61	0.44	230	6.3x7.7	F80	0.34	280	8x10	G10	0.20	450	8x10.5	GA5	0.17	450	
																	8x10.5	GA5	0.17	450	
220	6.3x5.8	F61	0.44	230	6.3x7.7	F80	0.34	280	6.3x7.7	F80	0.34	280	8x10.5	GA5	0.17	450	8x10.5	GA5	0.17	450	
	6.3x7.7	F80	0.34	280	8x6.5	G68	0.34	280	8x10	G10	0.20	450	10x10	H10	0.10	670	10x10	H10	0.10	670	
																	10x10.5	HA5	0.09	670	
330	6.3x7.7	F80	0.34	280	8x10.5	GA5	0.17	450	8x10.5	GA5	0.17	450	8x10.5	GA5	0.17	450	10x10.5	HA5	0.09	670	
	8x6.5	G68	0.34	200	10x10	H10	0.10	670	10x10	H10	0.10	670	10x10	H10	0.10	670					
	8x10	G10	0.20	450																	
470	8x10.5	GA5	0.17	450	8x10.5	GA5	0.17	450	8x10.5	GA5	0.17	450	10x10.5	HA5	0.09	670	—	—	—	—	
	10x10	H10	0.10	670	10x10	H10	0.10	670	10x10	H10	0.10	670									
680	8x10.5	GA5	0.17	450	10x10.5	HA5	0.09	670	10x10.5	HA5	0.09	670	—	—	—	—	—	—	—	—	
1000	8x10.5	GA5	0.17	450	10x10.5	HA5	0.09	670	—	—	—	—	—	—	—	—	—	—	—		
	10x10	H10	0.10	670																	
1500	10x10.5	HA5	0.09	670	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		

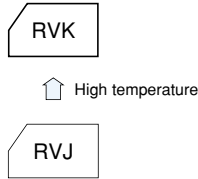
(Note) Rated ripple current : 105°C, 100kHz ; Impedance : 20°C, 100kHz

Chip type Aluminum Electrolytic Capacitors

Chip Type 125°C Capacitors

GREEN CAP SMD 125°C 1250hours 105°C 5000hours Anti-cleaning solvent

- Compatible with surface mounting.
- Supplied with carrier taping.
- Guarantees 1250 hours at 125°C. (ø8 : 1000 hours)
- Guarantees 5000 hours at 105°C. (ø8 : 4000 hours)



Marking color : Gold print on a brown sleeve

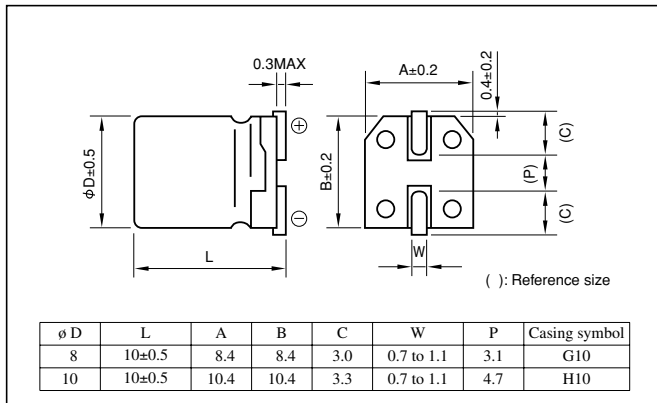
Specifications

Item	Performance							
Category temperature range (°C)	-40 to +125							
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)							
Leakage current (µA)	Less than 0.02CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)							
Tangent of loss angle (tanδ)	Rated voltage (V)	10	16	25	35	50	63	
	tanδ (max.)	0.28	0.26	0.24	0.20	0.19	0.18	
Characteristics at high and low temperature	Rated voltage (V)	10	16	25	35	50	63	
	Impedance ratio (max.)	Z-25°C / Z+20°C	3	3	3	3	3	3
		Z-40°C / Z+20°C	5	5	5	5	5	5
Endurance (Applied ripple current)	Test temp.	125°C			105°C			
	Test time	ø10 : 1250h, ø8 : 1000h			ø10 : 5000h, ø8 : 4000h			
	Percentage of capacitance change	Within ±30% of initial value						
	Tangent of the loss angle	300% or less of the initial specified value						
	Leakage current	The initial specified value or less						
Shelf life	Test temp.	125°C			105°C			
	Test time	500 h			1000h			
	Percentage of capacitance change	Within ±20% of initial value						
	Tangent of the loss angle	200% or less of the initial specified value						
	Leakage current	The initial specified value or less						
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)							

Aluminum Electrolytic Capacitors

Outline Drawing

Unit: mm



- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Coefficient of Frequency for Rated Ripple Current

Frequency(Hz)	120	1k	10k	100k
Rated voltage(V)				
10 to 63	0.77	0.88	0.96	1

Part numbering system (example: 16V220µF)

RVK	16	V	221	M	H10	U
Series code	Rated voltage symbol	Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol	Taping symbol

Standard Ratings

Rated voltage (V)	10				16				25				35				50				63				
	Item	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current
		ø D(mm)	Ω	Ω	mArms	ø D(mm)	Ω	Ω	mArms	ø D(mm)	Ω	Ω	mArms	ø D(mm)	Ω	Ω	mArms	ø D(mm)	Ω	Ω	mArms	ø D(mm)	Ω	Ω	mArms
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
220	8x10	2.1	0.68	60	10x10	2.0	0.55	107	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
330	10x10	1.4	0.55	111	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		

(Note) Impedance : 20°C, 100kHz : Rated ripple current : 125°C, 100kHz ; ESR : 20°C, 120Hz

## Chip Type, 125°C Use, Large Capacitance Capacitors

SMD 125°C 5000hours Anti-cleaning solvent

- Surface mount device.
- Supplied with taping.
- Guarantees 5000 hours at 125°C.

RVK (large)

High temperature

RVJ (large)



Marking color : White print on a brown sleeve

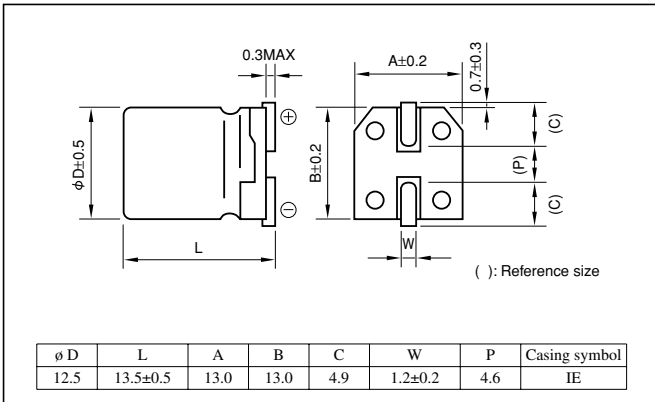
### Specifications

Item	Performance						
Category temperature range (°C)	-40 to +125						
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)						
Leakage current (µA)	Less than 0.02CV (after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)						
Tangent of loss angle (tanδ)	Rated voltage (V)	10	16	25	35	50	63
	tanδ (max.)	0.26	0.22	0.16	0.13	0.12	0.11
0.02 is added to each 1000µF (20°C, 120Hz)							
Characteristics at high and low temperature	Rated voltage (V)	10	16	25	35	50	63
	Impedance ratio (max.)	Z-25°C / Z+20°C	3	2	2	2	2
Z-40°C / Z+20°C							
5 4 3 3 3 3 3 (120Hz)							
Endurance (125°C) (Applied ripple current)	Test time	5000 hours					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±30% of initial value					
	Tangent of the loss angle	300% or less of the initial specified value					
Shelf life (125°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1						
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)						

Aluminum Electrolytic Capacitors Chip type

### Outline Drawing

Unit: mm



### Coefficient of Frequency for Rated Ripple Current

Frequency(Hz)	120	1k	10k	100k
Rated capacitance(µF)				
100	0.40	0.75	0.90	1
220 to 330	0.50	0.85	0.95	1
470	0.60	0.88	0.96	1

### Part numbering system (example: 10V470µF)

RVJ	—	10	V	471	M	IE	□	T	—	R5
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol			Taping symbol

- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

### Standard Ratings

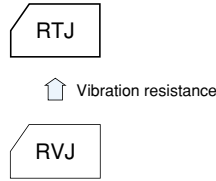
Rated voltage (V)	10				16				25				35				50				63			
	Case	Casing symbol	Imp. Ω	Rated ripple current mArms	Case	Casing symbol	Imp. Ω	Rated ripple current mArms	Case	Casing symbol	Imp. Ω	Rated ripple current mArms	Case	Casing symbol	Imp. Ω	Rated ripple current mArms	Case	Casing symbol	Imp. Ω	Rated ripple current mArms	Case	Casing symbol	Imp. Ω	Rated ripple current mArms
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12.5x13.5	IE	0.136	509	12.5x13.5	IE	0.176	447
220	—	—	—	—	—	—	—	—	—	—	—	—	12.5x13.5	IE	0.105	579	—	—	—	—	—	—	—	—
330	—	—	—	—	—	—	—	—	—	—	—	—	12.5x13.5	IE	0.105	579	—	—	—	—	—	—	—	—
470	12.5x13.5	IE	0.105	579	12.5x13.5	IE	0.105	579	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 125°C, 100kHz ; Impedance(Imp.) : 20°C, 100kHz

Chip Type, 105°C Use, Large Capacitance Capacitors

SMD Vibration Resistance 105°C 2000hours Anti-cleaning solvent

- Compatible with surface mounting.
- For Vibration resistance.
- Supplied with carrier taping.
- Guarantees 2000 hours at 105°C.



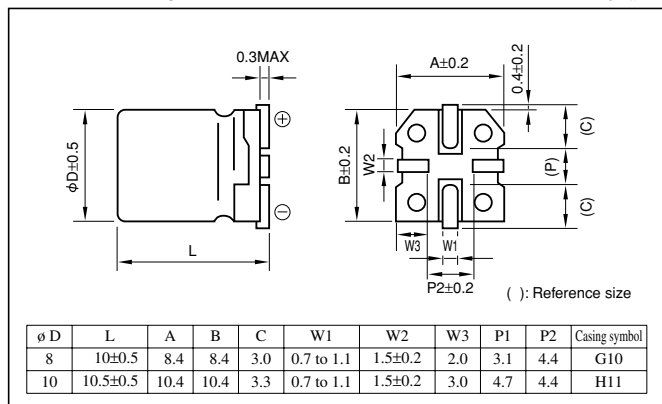
Marking color : White print on a brown sleeve

Specifications

Item	Performance									
Category temperature range (°C)	-55 to +105									
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)									
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)									
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	63	100	
	tanδ (max.)	0.30	0.26	0.22	0.16	0.13	0.12	0.11	0.10	(20°C, 120Hz)
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50	63	100	
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2	2	2	2
Endurance (105°C) (Applied ripple current)	Test time	2000 hours								
	Leakage current	The initial specified value or less								
	Percentage of capacitance change	Within ±20% of initial value								
	Tangent of the loss angle	200% or less of the initial specified value								
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1									
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)									

Chip type Aluminum Electrolytic Capacitors

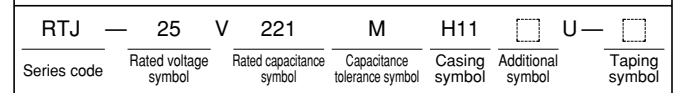
Outline Drawing



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50 · 60	120	1k	10k · 100k
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50 to 63	0.80	1	1.35	1.50
100	0.70	1	1.35	1.50

Part numbering system (example: 25V220µF)



- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Standard Ratings

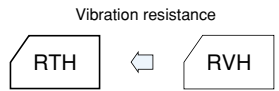
Rated voltage (V)	6.3				10				16				25				35				50				63				100			
	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current	Case	Casing symbol	ESR	Rated ripple current				
Rated capacitance (µF)	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms	φ D(mm)	Ω	mArms		
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
220	8x10	G10	2.3	178	8x10	G10	2.0	178	10x10.5	H11	1.7	324	10x10.5	H11	1.2	324	10x10.5	H11	2.2	324	10x10.5	H11	0.98	324	—	—	—	—	—	—		
330	8x10	G10	1.5	178	10x10.5	H11	1.3	324	10x10.5	H11	1.1	324	10x10.5	H11	0.80	324	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
470	10x10.5	H11	1.0	324	10x10.5	H11	0.92	324	10x10.5	H11	0.78	324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		

(Note) Rated ripple current : 105°C, 120Hz ; ESR : 20°C, 120Hz

## Chip Type, 105°C Use, Low Impedance Capacitors

SMD   Vibration Resistance   Low Impedance   105°C 2000hours   Anti-cleaning solvent

- Compatible with surface mounting.
- For Vibration resistance.
- Supplied with carrier taping.
- Guarantees 2000 hours at 105°C.



Marking color : White print on a brown sleeve

### Specifications

Item	Performance						
Category temperature range (°C)	-55 to +105						
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)						
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)						
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	
	tanδ (max.)	0.30	0.26	0.22	0.16	0.13	
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2
		Z-40°C / Z+20°C	8	5	4	3	3
Endurance (105°C) (Applied ripple current)	Test time	2000 hours					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±20% of initial value					
	Tangent of the loss angle	200% or less of the initial specified value					
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5102						
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)						

Aluminum Electrolytic Capacitors

### Outline Drawing

Unit: mm

( ) : Reference size

φ D	L	A	B	C	W1	W2	W3	P1	P2	Casing symbol
8	10±0.5	8.4	8.4	3.0	0.7 to 1.1	1.5±0.2	2.0	3.1	4.4	G10
10	10.5±0.5	10.4	10.4	3.3	0.7 to 1.1	1.5±0.2	3.0	4.7	4.4	H11

### Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	50 · 60	120	1k	10k · 100k
Coefficient	0.64	0.8	0.93	1

### Part numbering system (example: 25V100µF)

RTH	—	25	V	101	M	G10	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

### Standard Ratings

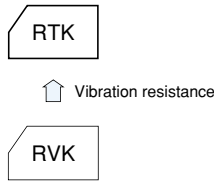
Rated voltage (V)	6.3				10				16				25				35			
	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current	Case	Casing symbol	Impedance	Rated ripple current
Rated capacitance (µF)	φ D(mm)		Ω	mArms	φ D(mm)		Ω	mArms	φ D(mm)		Ω	mArms	φ D(mm)		Ω	mArms	φ D(mm)		Ω	mArms
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8x10	G10	0.45	369
100	—	—	—	—	—	—	—	—	—	—	—	—	8x10	G10	0.45	369	10x10.5	H11	0.25	553
220	—	—	—	—	8x10	G10	0.45	369	—	—	—	—	10x10.5	H11	0.25	553	—	—	—	—
330	8x10	G10	0.45	369	—	—	—	—	10x10.5	H11	0.25	553	—	—	—	—	—	—	—	—
470	—	—	—	—	10x10.5	H11	0.25	553	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 105°C, 100kHz ; Impedance : 20°C, 100kHz

Chip Type 125°C Capacitors

- SMD
- Vibration Resistance
- 125°C 1250hours
- 105°C 5000hours
- Anti-cleaning solvent

- Compatible with surface mounting.
- For Vibration resistance.
- Supplied with carrier taping.
- Guarantees 1250 hours at 125°C. (ø8 : 1000 hours)
- Guarantees 5000 hours at 105°C. (ø8 : 4000 hours)



Marking color : Gold print on a brown sleeve

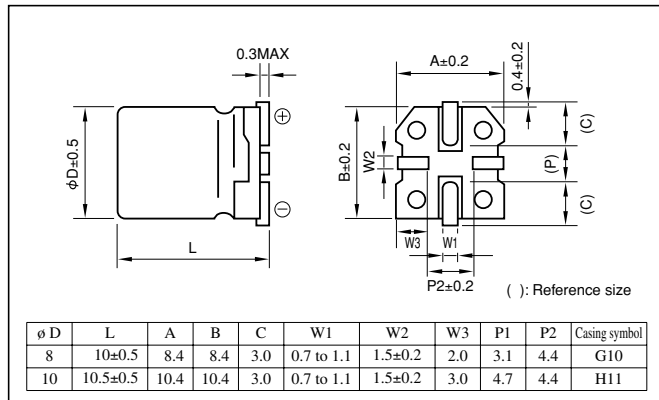
Specifications

Item	Performance							
Category temperature range (°C)	-40 to +125							
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)							
Leakage current (µA)	Less than 0.02CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)							
Tangent of loss angle (tanδ)	Rated voltage (V)	10	16	25	35	50	63	
	tanδ (max.)	0.28	0.26	0.24	0.20	0.19	0.18	
Characteristics at high and low temperature	Rated voltage (V)	10	16	25	35	50	63	
	Impedance ratio (max.)	Z-25°C / Z+20°C	3	3	3	3	3	3
		Z-40°C / Z+20°C	5	5	5	5	5	5
Endurance (Applied ripple current)	Test temp.	125°C			105°C			
	Test time	ø10 : 1250h, ø8 : 1000h			ø10 : 5000h, ø8 : 4000h			
	Percentage of capacitance change	Within ±30% of initial value						
	Tangent of the loss angle	300% or less of the initial specified value						
	Leakage current	The initial specified value or less						
Shelf life	Test temp.	125°C			105°C			
	Test time	500 h			1000h			
	Percentage of capacitance change	Within ±20% of initial value						
	Tangent of the loss angle	200% or less of the initial specified value						
	Leakage current	The initial specified value or less						
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)							

Aluminum Electrolytic Capacitors

Outline Drawing

Unit: mm



Coefficient of Frequency for Rated Ripple Current

Frequency(Hz)	120	1k	10k	100k
Rated voltage(V)				
10 to 63	0.77	0.88	0.96	1

Part numbering system (example: 16V220µF)

RTK	—	16	V	221	M	H11	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Standard Ratings

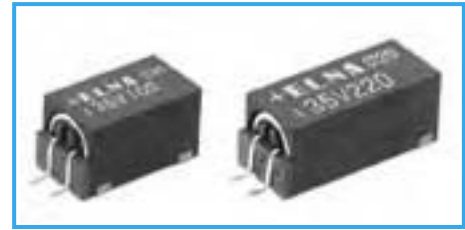
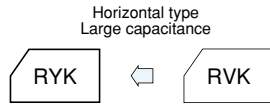
Rated voltage (V)	10				16				25				35				50				63			
	Case		ESR	Impedance	Case		ESR	Impedance	Case		ESR	Impedance	Case		ESR	Impedance	Case		ESR	Impedance	Case		ESR	Impedance
	ø D(mm)	Ω	Ω	mArms	ø D(mm)	Ω	Ω	mArms	ø D(mm)	Ω	Ω	mArms	ø D(mm)	Ω	Ω	mArms	ø D(mm)	Ω	Ω	mArms	ø D(mm)	Ω	Ω	mArms
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8x10	32	0.80	38	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8x10	14	0.80	38	8x10	14	1.00	33
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10x10.5	14	0.65	48	10x10.5	14	0.67	48
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8x10	10	0.80	40	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10x10.5	10	0.60	58	—	—	—	—
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8x10	7.1	0.68	55	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10x10.5	7.1	0.58	70	—	—	—	—
100	—	—	—	—	—	—	—	—	8x10	4.0	0.68	60	10x10.5	3.3	0.55	102	—	—	—	—	—	—	—	—
220	8x10	2.1	0.68	60	10x10.5	2.0	0.55	107	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
330	10x10.5	1.4	0.55	111	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Impedance : 20°C, 100kHz : Rated ripple current : 125°C, 100kHz ; ESR : 20°C, 120Hz

### Horizontal type, 125°C Use, High-temperature Capacitors

- SMD
- Vibration Resistance
- 125°C 1000hours
- Anti-cleaning solvent

- 125°C high temperature surface mount.
- Highly resistant to vibration.
- Available in horizontal configurations only.
- Carrier taping supplied.
- Guarantees 1000 hours at 125°C.



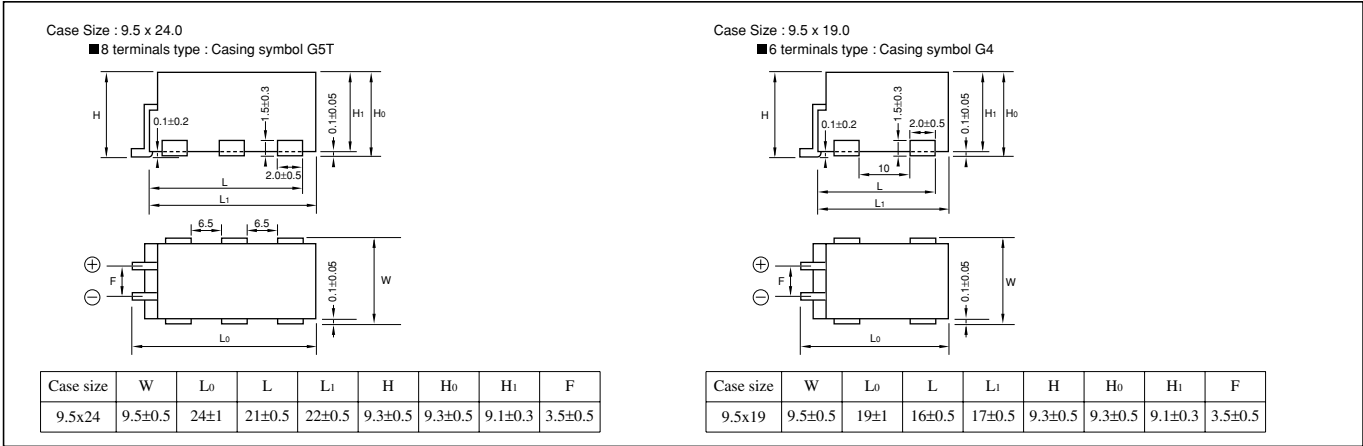
Marking color : White print on a black case

### Specifications

Item	Performance								
Category temperature range (°C)	-40 to +125								
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)								
Leakage current (µA)	Less than 0.02CV (after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)								
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	63	
	tanδ (max.)	0.3	0.28	0.26	0.24	0.20	0.19	0.18	
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50	63	
	Impedance ratio (max.)	Z-25°C / Z+20°C	3	3	3	3	3	3	3
		Z-40°C / Z+20°C	5	5	5	5	5	5	5
Endurance (125°C) (Applied ripple current)	Test time	1000 hours							
	Percentage of capacitance change	Within ±30% of initial value							
	Tangent of the loss angle	300% or less of the initial specified value							
	Leakage current	The initial specified value or less							
Shelf life (125°C)	Test time	1000 hours							
	Percentage of capacitance change	Within ±20% of initial value							
	Tangent of the loss angle	200% or less of the initial specified value							
	Leakage current	The initial specified value or less							
Applicable standards	Pretreatment performed JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)								

### Outline Drawing

Unit: mm



- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Part numbering system (example: 10V560µF)					
RYK	—	10	V	561	M G5T T — FL
Series code	Rated voltage symbol	Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Tray polarity symbol

### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	120	1k	10k	100k
10 to 63	0.77	0.88	0.96	1

### Standard Ratings

Rated capacitance (µF)	3 . 6			0 1			6 1			5 2			5 3			0 5			63		
	Case	Impedance	Rated ripple current	Case	Impedance	Rated ripple current	Case	Impedance	Rated ripple current	Case	Impedance	Rated ripple current	Case	Impedance	Rated ripple current	Case	Impedance	Rated ripple current	Case	Impedance	Rated ripple current
56	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
82	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9.5x19.0	0.49	210	9.5x24.0	0.37	272
100	—	—	—	—	—	—	—	—	—	—	—	—	9.5x19.0	0.40	232	9.5x24.0	0.35	279	—	—	—
220	—	—	—	—	—	—	—	—	—	9.5x19.0	0.40	232	9.5x24.0	0.30	302	—	—	—	—	—	—
270	—	—	—	—	—	—	9.5x19.0	0.40	232	9.5x24.0	0.30	302	—	—	—	—	—	—	—	—	—
470	—	—	—	9.5x19.0	0.40	232	9.5x24.0	0.30	302	—	—	—	—	—	—	—	—	—	—	—	—
560	9.5x19.0	0.40	232	9.5x24.0	0.30	302	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
820	9.5x24.0	0.30	302	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 125°C, 100kHz ; Impedance : 20°C, 100kHz

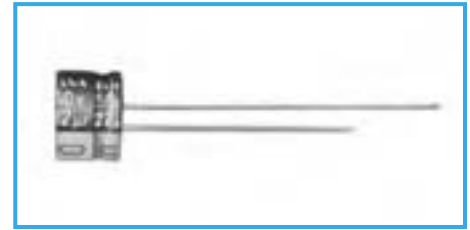
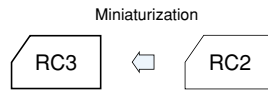
Aluminum Electrolytic Capacitors Chip type



5mm L Standard Capacitors

GREEN CAP

• Diameters from  $\phi 3$  to  $\phi 8$ mm and a height of 5mm.



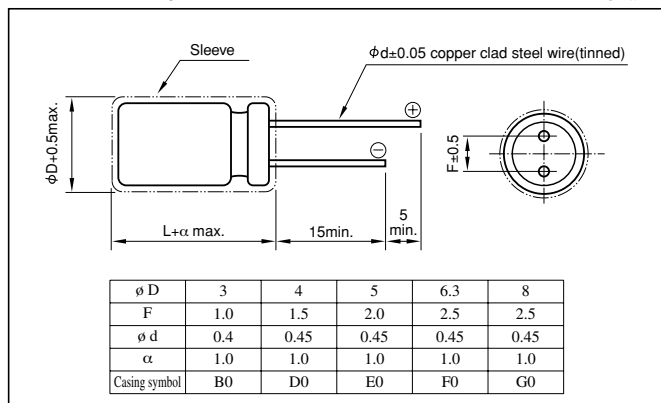
Marking color : White print on a blue sleeve ( $\phi 3$ : black sleeve)

Specifications

Item	Performance								
Category temperature range (°C)	-40 to +85								
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)								
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)								
Tangent of loss angle (tanδ)	Rated voltage (V)		4	6.3	10	16	25	35	50
	tanδ (max.)	$\phi 3$ to $\phi 6.3$	0.35	0.24	0.20	0.16	0.14	0.12	0.10
		$\phi 8$	0.39	0.28	0.24	0.16	0.14	0.12	0.10
Characteristics at high and low temperature	Rated voltage (V)		4	6.3	10	16	25	35	50
	Impedance ratio (max.)	Z-25°C / Z+20°C	6	4	3	2	2	2	2
		Z-40°C / Z+20°C	16	10	8	6	4	4	4
Endurance (85°C) (Applied ripple current)	Test time	1000 hours							
	Leakage current	The initial specified value or less							
	Percentage of capacitance change	Within ±20% of initial value							
	Tangent of the loss angle	200% or less of the initial specified value							
Shelf life (85°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1								
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)								

Miniature Aluminum Electrolytic Capacitors

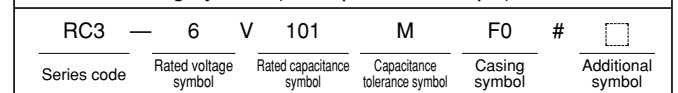
Outline Drawing



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50 · 60	120	1k	10k · 100k
4 to 16	0.8	1	1.1	1.2
25 to 35	0.8	1	1.5	1.7
50	0.8	1	1.6	1.9

Part numbering system (example: 6.3V100µF)



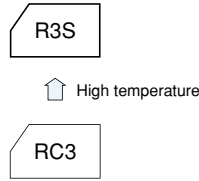
Standard Ratings

Rated capacitance(µF)	4		6.3		10		16		25		35		50	
	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
Item	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms
0.1	—	—	—	—	—	—	—	—	—	—	—	—	• 4x5	3(3)
0.22	—	—	—	—	—	—	—	—	—	—	—	—	• 4x5	5(4)
0.33	—	—	—	—	—	—	—	—	—	—	—	—	• 4x5	6(5)
0.47	—	—	—	—	—	—	—	—	—	—	—	—	• 4x5	7(6)
1	—	—	—	—	—	—	—	—	—	—	—	—	• 4x5	10(8)
2.2	—	—	—	—	—	—	—	—	—	—	—	• 4x5	14(11)	4x5 15
3.3	—	—	—	—	—	—	—	—	• 4x5	15(13)	4x5	17	4x5	18
4.7	—	—	—	—	—	—	• 4x5	17(14)	4x5	18	4x5	20	5x5	25
10	—	—	• 4x5	20(17)	4x5	22	4x5	25	5x5	30	5x5	30	6.3x5	40
22	• 4x5	25(21)	4x5	30	5x5	35	5x5	40	6.3x5	50	6.3x5	55	8x5	75
33	4x5	30	5x5	40	5x5	45	6.3x5	60	6.3x5	65	8x5	80	8x5	90
47	4x5	35	5x5	50	6.3x5	65	6.3x5	70	8x5	95	8x5	100	—	—
100	5x5	60	6.3x5	85	6.3x5	95	8x5	125	8x5	135	—	—	—	—
220	6.3x5	105	8x5	145	8x5	155	—	—	—	—	—	—	—	—
330	8x5	150	8x5	175	—	—	—	—	—	—	—	—	—	—
470	8x5	180	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz ; The types of capacitor marked with a black circle are manufactured in the  $\phi 3$ x5 size also; the figures in the parentheses are applicable to capacitors with  $\phi 3$ .

**5mm L, 105°C Use Capacitors** GREEN CAP 105°C 1000hours Anti-cleaning solvent

- Diameters from  $\phi$  4 to  $\phi$  6.3mm and a height of 5mm.
- Guarantees 1000 hours at 105°C.



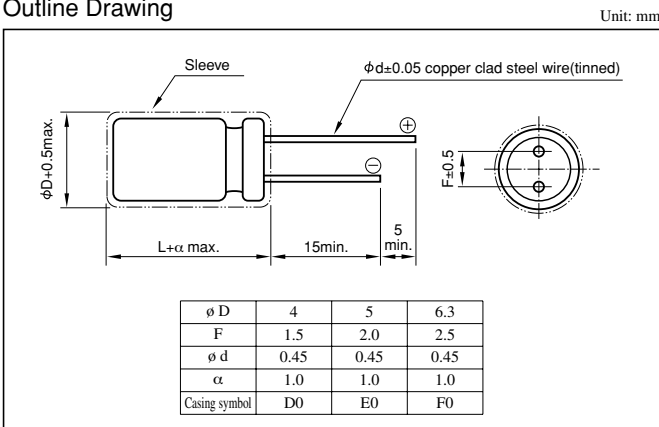
Marking color : White print on a black sleeve

### Specifications

Item	Performance	
Category temperature range (°C)	-55 to +105	
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)	
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)	
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3    10    16    25    35    50
	tanδ (max.)	0.28    0.24    0.20    0.14    0.12    0.10
Characteristics at high and low temperature	Rated voltage (V)	6.3    10    16    25    35    50
	Impedance ratio (max.)	Z-25°C / Z+20°C    3    3    2    2    2    2 Z-40°C / Z+20°C    8    5    4    3    3    3
Endurance (105°C) (Applied ripple current)	Test time	1000 hours
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±20% of initial value
	Tangent of the loss angle	200% or less of the initial specified value
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1	
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)	

Aluminum Electrolytic Capacitors Miniature

### Outline Drawing



### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50 · 60	120	1k	10k · 100k
6.3 to 16	0.64	0.80	0.92	1
25 to 35	0.57	0.71	0.89	1
50	0.53	0.67	0.90	1

### Part numbering system (example: 16V47µF)

R3S	—	16	V	470	M	F0	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

### Standard Ratings

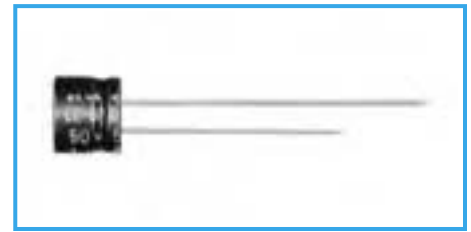
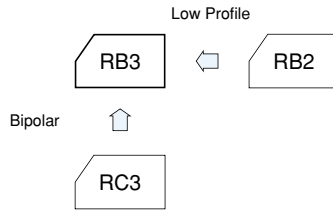
Rated voltage(V) / Rated capacitance(µF)	6.3		10		16		25		35		50	
	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
Item	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms
0.1	—	—	—	—	—	—	—	—	—	—	4x5	3
0.22	—	—	—	—	—	—	—	—	—	—	4x5	5
0.33	—	—	—	—	—	—	—	—	—	—	4x5	6
0.47	—	—	—	—	—	—	—	—	—	—	4x5	8
1	—	—	—	—	—	—	—	—	—	—	4x5	11
2.2	—	—	—	—	—	—	—	—	—	—	4x5	17
3.3	—	—	—	—	—	—	—	—	4x5	17	4x5	20
4.7	—	—	—	—	4x5	15	4x5	18	4x5	20	5x5	27
10	—	—	4x5	20	4x5	23	5x5	31	5x5	34	6.3x5	45
22	4x5	26	5x5	34	5x5	38	6.3x5	53	6.3x5	57	—	—
33	5x5	33	5x5	43	6.3x5	56	6.3x5	66	—	—	—	—
47	5x5	45	6.3x5	58	6.3x5	65	—	—	—	—	—	—
100	6.3x5	78	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 105°C, 100kHz.

5mm L Bipolar Capacitors

GREEN CAP

- Diameters from  $\phi 4$  to  $\phi 6.3$ mm and a height of 5mm.

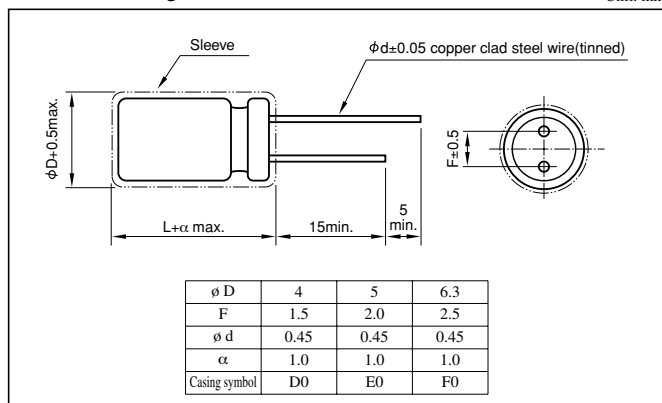


Marking color : White print on a blue sleeve

Specifications

Item	Performance																		
Category temperature range (°C)	-40 to +85																		
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)																		
Leakage current (µA)	Less than 0.03CV + 3 (after 5 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)																		
Tangent of loss angle (tanδ)	Rated voltage (V)																		
	tanδ (max.)	<table border="1"> <tr> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td><math>\phi 4</math></td> <td>0.35</td> <td>0.30</td> <td>0.25</td> <td>0.20</td> <td>0.20</td> </tr> <tr> <td><math>\phi 5, 6.3</math></td> <td>0.30</td> <td>0.25</td> <td>0.20</td> <td>0.15</td> <td>0.15</td> </tr> </table>	6.3	10	16	25	35	50	$\phi 4$	0.35	0.30	0.25	0.20	0.20	$\phi 5, 6.3$	0.30	0.25	0.20	0.15
6.3	10	16	25	35	50														
$\phi 4$	0.35	0.30	0.25	0.20	0.20														
$\phi 5, 6.3$	0.30	0.25	0.20	0.15	0.15														
Endurance (85°C) (Applied ripple current)	Test time	1000 hours (with the polarity inverted every 250 hours)																	
	Leakage current	The initial specified value or less																	
	Percentage of capacitance change	Within ±20% of initial value																	
	Tangent of the loss angle	200% or less of the initial specified value																	
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)																		

Outline Drawing



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50 · 60	120	1k	10k · 100k
6.3 to 16	0.8	1	1.1	1.2
25 to 35	0.8	1	1.5	1.7
50	0.8	1	1.6	1.9

Part numbering system (example: 10V47µF)

RB3	—	10	V	470	M	F0	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

Standard Ratings

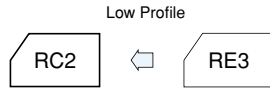
Rated voltage(V)	6.3		10		16		25		35		50	
	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
Rated capacitance(µF)	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms
0.1	—	—	—	—	—	—	—	—	—	—	4x5	2
0.22	—	—	—	—	—	—	—	—	—	—	4x5	3
0.33	—	—	—	—	—	—	—	—	—	—	4x5	4
0.47	—	—	—	—	—	—	—	—	—	—	4x5	5
1	—	—	—	—	—	—	—	—	—	—	4x5	7
2.2	—	—	—	—	—	—	—	—	4x5	11	5x5	14
3.3	—	—	—	—	—	—	4x5	13	5x5	17	6.3x5	20
4.7	—	—	—	—	4x5	14	5x5	21	6.3x5	24	6.3x5	24
10	—	—	4x5	18	5x5	26	6.3x5	35	6.3x5	35	—	—
22	5x5	31	6.3x5	40	6.3x5	45	—	—	—	—	—	—
33	6.3x5	45	6.3x5	49	—	—	—	—	—	—	—	—
47	6.3x5	54	6.3x5	59	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz.

## 7mm L, Standard Capacitors

GREEN CAP Anti-cleaning solvent

- Conventional RC2 further downsized, diameters from  $\phi 4$  to  $\phi 8$ mm.
- Guarantees 1000 hours at 85°C.



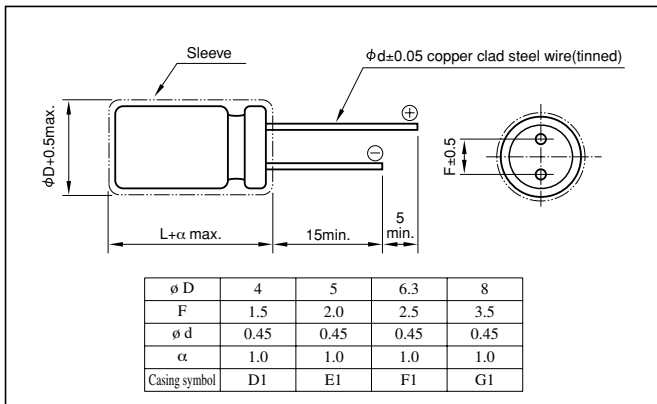
Marking color : White print on a blue sleeve

### Specifications

Item	Performance										
Category temperature range (°C)	-40 to +85										
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)										
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)										
Tangent of loss angle (tanδ)	Rated voltage (V)	4	6.3	10	16	25	35	50	63	100	
	tanδ (max.)	0.35	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.08	
Characteristics at high and low temperature	Rated voltage (V)	4	6.3	10	16	25	35	50	63	100	
	Impedance ratio (max.)	Z-25°C / Z+20°C	6	4	3	2	2	2	2	2	2
		Z-40°C / Z+20°C	16	10	8	6	4	4	4	4	4
Endurance (85°C) (Applied ripple current)	Test time	1000 hours									
	Leakage current	The initial specified value or less									
	Percentage of capacitance change	Within ±20% of initial value									
	Tangent of the loss angle	200% or less of the initial specified value									
Shelf life (85°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1										
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)										

### Outline Drawing

Unit: mm



### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50 · 60	120	1k	10k · 100k
4 to 16	0.8	1	1.1	1.2
25 to 35	0.8	1	1.5	1.7
50 to 100	0.8	1	1.6	1.9

### Part numbering system (example: 10V220µF)

RC2	—	10	V	221	M	G1	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

### Standard Ratings

Rated voltage(V)	4		6.3		10		16		25		35		50		63		100		
	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	
Rated capacitance(µF)	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	4x7	4	4x7	4	—	—
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	4x7	5	4x7	6	—	—
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	4x7	7	4x7	7	—	—
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	4x7	8	4x7	8	—	—
1	—	—	—	—	—	—	—	—	—	—	—	—	—	4x7	10	4x7	10	4x7	12
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	4x7	15	4x7	15	5x7	20
3.3	—	—	—	—	—	—	—	—	4x7	15	4x7	15	4x7	20	4x7	23	6.3x7	30	—
4.7	—	—	—	—	—	—	—	—	4x7	20	4x7	20	4x7	24	5x7	30	6.3x7	35	—
10	—	—	—	—	—	—	4x7	25	4x7	30	4x7	30	5x7	40	6.3x7	50	—	—	—
22	—	—	4x7	35	4x7	35	4x7	40	5x7	50	5x7	55	6.3x7	70	—	—	—	—	—
33	4x7	35	4x7	40	4x7	45	5x7	55	6.3x7	70	6.3x7	75	8x7	100	—	—	—	—	—
47	4x7	40	4x7	50	5x7	60	5x7	70	6.3x7	85	8x7	110	—	—	—	—	—	—	—
100	5x7	70	5x7	80	6.3x7	105	6.3x7	120	8x7	145	—	—	—	—	—	—	—	—	—
220	6.3x7	120	6.3x7	140	8x7	185	8x7	205	—	—	—	—	—	—	—	—	—	—	—
330	8x7	170	8x7	205	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

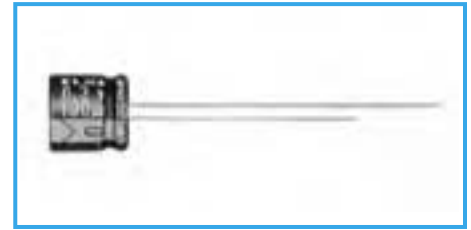
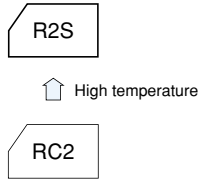
(Note) Rated ripple current : 85°C, 120Hz.

Aluminum Electrolytic Capacitors Miniature

7mm L, 105°C Use Capacitors

GREEN CAP 105°C 1000hours Anti-cleaning solvent

- Diameters from  $\phi 4$  to  $\phi 6.3$ mm and a height of 7mm.
- Guarantees 1000 hours at 105°C.



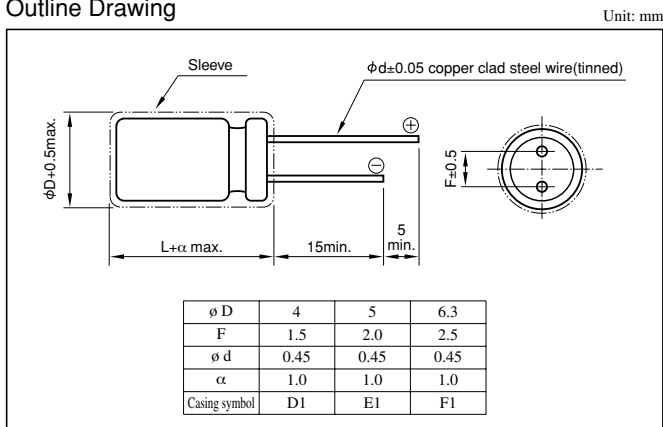
Marking color : White print on a black sleeve

Specifications

Item	Performance	
Category temperature range (°C)	-55 to +105	
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)	
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)	
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3 10 16 25 35 50
	tanδ (max.)	0.22 0.19 0.16 0.14 0.12 0.10 (20°C, 120Hz)
Characteristics at high and low temperature	Rated voltage (V)	6.3 10 16 25 35 50
	Impedance ratio (max.)	Z-25°C / Z+20°C: 3 3 2 2 2 2 Z-40°C / Z+20°C: 8 5 4 3 3 3 (120Hz)
Endurance (105°C) (Applied ripple current)	Test time	1000 hours
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±20% of initial value
	Tangent of the loss angle	200% or less of the initial specified value
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment : According to JIS C5101-1	
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)	

Aluminum Electrolytic Capacitors Miniature

Outline Drawing



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50 · 60	120	1k	10k · 100k
6.3 to 16	0.68	0.72	0.92	1
25 to 35	0.48	0.63	0.80	1
50	0.45	0.50	0.70	1

Part numbering system (example: 25V33µF)

R2S	—	25	V	330	M	F1	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

Standard Ratings

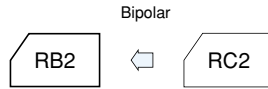
Rated voltage(V)	6.3		10		16		25		35		50	
	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
Rated capacitance(µF)	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms	$\phi$ DxL(mm)	mArms
0.1	—	—	—	—	—	—	—	—	—	—	4x7	6
0.22	—	—	—	—	—	—	—	—	—	—	4x7	8
0.33	—	—	—	—	—	—	—	—	—	—	4x7	10
0.47	—	—	—	—	—	—	—	—	—	—	4x7	12
1	—	—	—	—	—	—	—	—	—	—	4x7	16
2.2	—	—	—	—	—	—	—	—	—	—	4x7	25
3.3	—	—	—	—	—	—	4x7	21	4x7	23	4x7	28
4.7	—	—	—	—	—	—	4x7	25	4x7	25	5x7	48
10	—	—	—	—	4x7	39	5x7	47	5x7	48	6.3x7	75
22	4x7	42	4x7	49	5x7	54	6.3x7	87	6.3x7	90	—	—
33	5x7	53	5x7	60	6.3x7	83	6.3x7	90	—	—	—	—
47	5x7	64	6.3x7	95	6.3x7	95	—	—	—	—	—	—
100	6.3x7	96	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 105°C, 100kHz.

## 7mm L Bipolar Capacitors

GREEN CAP Anti-cleaning solvent

• Diameters from  $\phi 4$  to  $\phi 6.3$ mm and a height of 7mm.

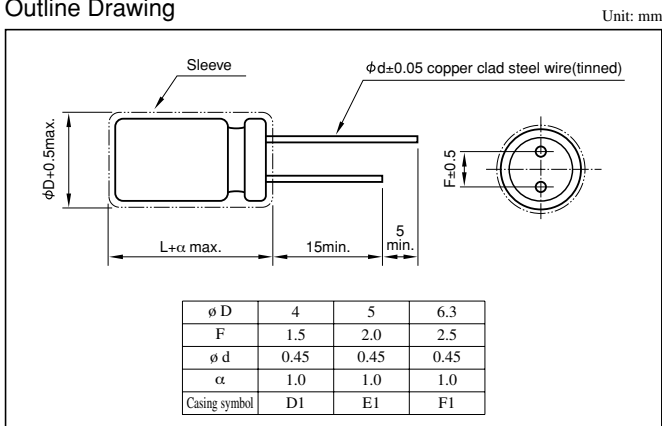


Marking color : White print on a blue sleeve

### Specifications

Item	Performance						
Category temperature range (°C)	-40 to +85						
Tolerance at rated capacitance (%)	$\pm 20$ (20°C, 120Hz)						
Leakage current ( $\mu$ A)	Less than $0.03CV + 3$ (after 5 minutes) C: Rated capacitance( $\mu$ F); V: Rated voltage(V) (20°C)						
Tangent of loss angle (tan $\delta$ )	Rated voltage (V)	6.3	10	16	25	35	50
	tan $\delta$ (max.)	0.30	0.25	0.20	0.15	0.15	0.15
Endurance (85°C)	Test time	1000 hours (with the polarity inverted every 250 hours)					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within $\pm 20\%$ of initial value					
	Tangent of the loss angle	200% or less of the initial specified value					
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)						

### Outline Drawing



### Coefficient of Frequency for Rated Ripple Current

Rated voltage (V)	Frequency (Hz)			
	50 · 60	120	1k	10k · 100k
6.3 to 16	0.8	1	1.1	1.2
25 to 35	0.8	1	1.5	1.7
50	0.8	1	1.6	1.9

### Part numbering system (example: 16V47 $\mu$ F)

RB2	—	16	V	470	M	F1	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

### Standard Ratings

Rated voltage (V)	6.3		10		16		25		35		50	
	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
Rated capacitance ( $\mu$ F)	$\phi$ DxL (mm)	mArms	$\phi$ DxL (mm)	mArms	$\phi$ DxL (mm)	mArms	$\phi$ DxL (mm)	mArms	$\phi$ DxL (mm)	mArms	$\phi$ DxL (mm)	mArms
0.1	—	—	—	—	—	—	—	—	—	—	4x7	3
0.22	—	—	—	—	—	—	—	—	—	—	4x7	4
0.33	—	—	—	—	—	—	—	—	—	—	4x7	5
0.47	—	—	—	—	—	—	—	—	—	—	4x7	6
1	—	—	—	—	—	—	—	—	—	—	4x7	9
2.2	—	—	—	—	—	—	—	—	4x7	14	5x7	16
3.3	—	—	—	—	—	—	4x7	17	5x7	19	5x7	19
4.7	—	—	—	—	4x7	17	5x7	23	5x7	23	6.3x7	27
10	—	—	4x7	23	5x7	29	6.3x7	39	6.3x7	39	—	—
22	5x7	35	5x7	39	6.3x7	50	6.3x7	58	—	—	—	—
33	5x7	43	6.3x7	55	6.3x7	61	6.3x7	71	—	—	—	—
47	6.3x7	60	6.3x7	66	6.3x7	73	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz.

Standard Capacitors

GREEN CAP

Anti-cleaning solvent 250V Max.

• Guarantees 2000 hours at 85°C.

RJ4

High temperature

RE3



Marking color : White print on a blue sleeve

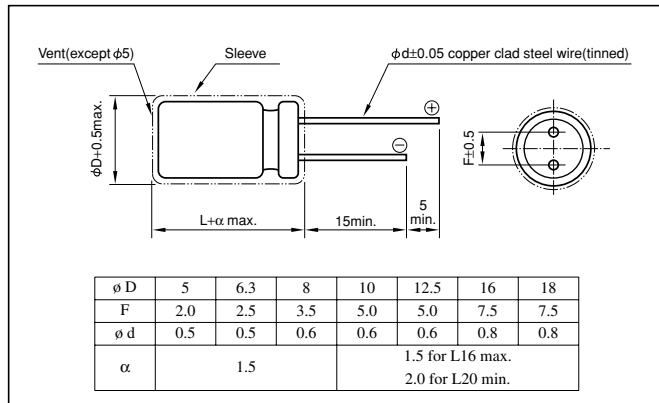
Specifications

Item	Performance																																															
Category temperature range (°C)	-40 to +85																																															
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)																																															
Leakage current (µA)	<table border="1"> <tr> <td>Rated voltage (V)</td> <td colspan="5">6.3 to 100</td> <td colspan="5">160 to 450</td> </tr> <tr> <td>Leakage current (µA)</td> <td colspan="5">Less than 0.03CV or 4 whichever is larger(after 1 minute) Less than 0.01CV or 3 whichever is larger(after 2 minutes)</td> <td colspan="5">CV≤1000: Less than 0.1CV+40(after 1 minute) CV&gt;1000: Less than 0.04CV+100(after 1 minute)</td> </tr> </table>	Rated voltage (V)	6.3 to 100					160 to 450					Leakage current (µA)	Less than 0.03CV or 4 whichever is larger(after 1 minute) Less than 0.01CV or 3 whichever is larger(after 2 minutes)					CV≤1000: Less than 0.1CV+40(after 1 minute) CV>1000: Less than 0.04CV+100(after 1 minute)																													
	Rated voltage (V)	6.3 to 100					160 to 450																																									
Leakage current (µA)	Less than 0.03CV or 4 whichever is larger(after 1 minute) Less than 0.01CV or 3 whichever is larger(after 2 minutes)					CV≤1000: Less than 0.1CV+40(after 1 minute) CV>1000: Less than 0.04CV+100(after 1 minute)																																										
C: Rated capacitance(µF) V: Rated voltage(V) (20°C)																																																
Tangent of loss angle (tanδ)	<table border="1"> <tr> <td>Rated voltage (V)</td> <td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td><td>160</td><td>200</td><td>250</td><td>315</td><td>350</td><td>400</td><td>450</td> </tr> <tr> <td>tanδ (max.)</td> <td>0.28</td><td>0.24</td><td>0.20</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.08</td><td>0.20</td><td>0.20</td><td>0.20</td><td>0.24</td><td>0.24</td><td>0.24</td><td>0.24</td> </tr> </table>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	160	200	250	315	350	400	450	tanδ (max.)	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.20	0.20	0.20	0.24	0.24	0.24	0.24															
	Rated voltage (V)	6.3	10	16	25	35	50	63	100	160	200	250	315	350	400	450																																
tanδ (max.)	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.20	0.20	0.20	0.24	0.24	0.24	0.24																																	
0.02 is added to every 1000µF increase over 1000µF. (20°C,120Hz)																																																
Characteristics at high and low temperature	<table border="1"> <tr> <td>Rated voltage (V)</td> <td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td><td>160</td><td>200</td><td>250</td><td>315</td><td>350</td><td>400</td><td>450</td> </tr> <tr> <td rowspan="2">Impedance ratio (max.)</td> <td>Z-25°C / Z+20°C</td> <td>5</td><td>4</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>12</td><td>10</td><td>8</td><td>5</td><td>4</td><td>3</td><td>3</td><td>15</td><td>15</td><td>15</td><td>10</td><td>10</td><td>10</td><td>10</td> </tr> </table>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	160	200	250	315	350	400	450	Impedance ratio (max.)	Z-25°C / Z+20°C	5	4	3	2	2	2	2	4	4	4	4	4	4	4	Z-40°C / Z+20°C	12	10	8	5	4	3	3	15	15	15	10	10	10	10
	Rated voltage (V)	6.3	10	16	25	35	50	63	100	160	200	250	315	350	400	450																																
Impedance ratio (max.)	Z-25°C / Z+20°C	5	4	3	2	2	2	2	4	4	4	4	4	4	4																																	
	Z-40°C / Z+20°C	12	10	8	5	4	3	3	15	15	15	10	10	10	10																																	
(120Hz)																																																
Endurance (85°C) (Applied ripple current)	Test time	2000 hours																																														
	Leakage current	The initial specified value or less																																														
	Percentage of capacitance change	Within ±20% of initial value																																														
	Tangent of the loss angle	200% or less of the initial specified value																																														
Shelf life (85°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment																																															
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)																																															

Miniature Aluminum Electrolytic Capacitors

Outline Drawing

Unit: mm



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz) CV(µF×WV)	50 - 60	120	1k	10k	100k
		6.3 to 16	All CV value	0.8	1	1.1
25 to 35	≤1000	0.8	1	1.5	1.7	1.7
	1000<	0.8	1	1.2	1.3	1.3
50 to 100	≤1000	0.8	1	1.6	1.9	1.9
	1000<	0.8	1	1.2	1.3	1.3
160 to 450	All CV value	0.8	1	1.3	1.5	1.6

Part numbering system (example: 16V100µF)

RE3	—	16	V	102	M	H4	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

Casing symbol

Size φ DxL(mm)	Casing Symbol	Size φ DxL(mm)	Casing Symbol
5x11	E3	12.5x25	I 6
6.3x11	F3	16x25	J 6
8x11.5	G3	16x31.5	J 7
10x12.5	H3	16x35.5	J 8
10x16	H4	18x35.5	K8
10x20	H5	18x40	K9
12.5x20	I 5		

• The standard ratings are described on the next page.

**NOTE**  
Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

### Standard Ratings

Rated capacitance (μF)	Item	6.3			10			16			25			35			50			63			100										
		Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current								
		φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms								
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	1990	3	—	—	—	5x11	1330	2.1									
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	905	6	—	—	—	5x11	603	4.7									
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	603	9	—	—	—	5x11	402	7									
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	423	13	—	—	—	5x11	282	10									
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	199	21	—	—	—	5x11	133	21									
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	90.5	31	—	—	—	5x11	60.3	30									
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	60.3	38	—	—	—	5x11	40.2	40									
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	56.5	38	5x11	49.4	40	5x11	42.3	45	5x11	35.3	45	5x11	28.2	45			
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	33.2	50	5x11	26.5	55	5x11	23.2	59	5x11	19.9	66	5x11	16.6	66	6.3x11	13.3	75
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	15.1	75	5x11	12.1	82	5x11	10.6	87	5x11	9.05	98	5x11	7.54	100	6.3x11	6.03	130
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	10.1	92	5x11	8.04	100	5x11	7.04	107	5x11	6.03	126	6.3x11	5.03	140	8x11.5	4.02	180
47	—	—	—	5x11	8.47	99	5x11	7.06	110	5x11	5.65	118	5x11	4.94	130	6.3x11	4.23	155	6.3x11	3.53	170	10x12.5	2.82	230									
100	—	—	—	5x11	3.78	146	5x11	3.32	160	6.3x11	2.65	199	6.3x11	2.32	214	8x11.5	1.99	260	10x12.5	1.66	300	10x20	1.33	370									
220	5x11	2.11	200	6.3x11	1.81	240	6.3x11	1.51	264	8x11.5	1.21	349	10x12.5	1.06	443	10x12.5	0.905	443	10x16	7.54	470	12.5x20	0.603	620									
330	6.3x11	1.41	270	6.3x11	1.21	290	8x11.5	1.01	383	10x12.5	0.804	510	10x12.5	0.704	542	10x16	0.603	595	10x20	0.503	710	12.5x25	0.402	760									
470	6.3x11	0.988	322	8x11.5	0.847	417	8x11.5	0.706	457	10x12.5	0.565	545	10x16	0.494	664	12.5x20	0.423	887	12.5x20	0.353	900	16x25	0.282	1000									
1000	8x11.5	0.464	546	10x12.5	0.398	650	10x16	0.332	791	10x20	0.265	996	12.5x20	0.232	1210	12.5x25	0.199	1400	16x25	0.166	1300	18x40	0.133	1380									
2200	10x20	0.226	1010	10x20	0.196	1080	12.5x20	0.166	1350	12.5x25	0.136	1660	16x25	0.121	1950	16x35.5	0.106	2340	—	—	—	—	—	—									
3300	10x20	0.161	1230	12.5x20	0.141	1430	12.5x25	0.121	1690	16x25	0.101	2030	16x35.5	0.09	2510	18x35.5	0.08	2810	—	—	—	—	—	—									
4700	12.5x20	0.12	1710	12.5x25	0.106	1780	16x25	0.092	2100	16x31.5	0.078	2650	18x35.5	0.071	2990	—	—	—	—	—	—	—	—	—									
6800	12.5x25	0.093	1930	16x25	0.083	2200	16x35.5	0.073	2580	18x35.5	0.063	3290	—	—	—	—	—	—	—	—	—	—	—	—									
10000	16x25	0.076	2450	16x35.5	0.07	2700	18x35.5	0.063	3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—									
15000	16x35.5	0.062	2860	18x35.5	0.058	3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—									
22000	18x40	0.053	3340	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—									

Miniature Aluminum Electrolytic Capacitors

Rated capacitance (μF)	Item	160			200			250			315			350			400			450			
		Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	
		φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	
0.47	6.3x11	706	15	6.3x11	706	15	6.3x11	706	15	6.3x11	847	15	6.3x11	847	15	6.3x11	847	15	8x11.5	847	18		
1	6.3x11	332	22	6.3x11	332	22	6.3x11	332	22	6.3x11	398	22	6.3x11	398	22	6.3x11	398	22	8x11.5	398	25		
2.2	6.3x11	151	32	6.3x11	151	32	6.3x11	151	32	8x11.5	181	38	8x11.5	181	38	8x11.5	181	38	10x12.5	181	43		
3.3	6.3x11	101	40	6.3x11	101	40	8x11.5	101	48	10x12.5	121	53	10x12.5	121	53	10x12.5	121	54	10x16	121	59		
4.7	6.3x11	70.6	48	8x11.5	70.6	56	8x11.5	70.6	56	10x12.5	84.7	65	10x12.5	84.7	65	10x16	84.7	71	10x20	84.7	76		
10	8x11.5	33.2	81	10x12.5	33.2	94	10x16	33.2	101	10x20	39.8	115	10x20	39.8	115	12.5x20	39.8	123	12.5x20	39.8	123		
22	10x16	15.1	151	10x20	15.1	170	12.5x20	15.1	182	12.5x20	18.1	182	12.5x25	18.1	197	12.5x25	18.1	197	16x25	18.1	226		
33	10x20	10.1	202	12.5x20	10.1	223	12.5x25	10.1	243	16x25	12.1	277	16x25	12.1	277	16x25	12.1	277	16x31.5	12.1	304		
47	12.5x20	7.06	266	12.5x25	7.06	265	12.5x25	7.06	295	16x25	8.47	330	16x25	8.47	330	16x31.5	8.47	361	16x35.5	8.47	380		
100	12.5x25	3.32	422	16x25	3.32	483	16x31.5	3.32	528	18x31.5	3.98	567	18x31.5	3.98	567	—	—	—	—	—	—	—	
220	16x31.5	1.51	783	18x35.5	1.51	882	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
330	18x35.5	1.01	1080	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) ESR : 20°C, 120Hz ; Rated ripple current : 85°C, 120Hz



Standard Bipolar Capacitors

GREEN CAP Anti-cleaning solvent

• Guarantees 2000 hours at 85°C.

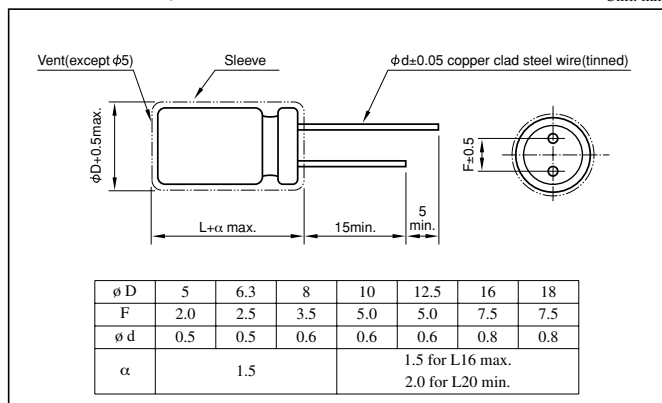


Marking color : White print on a blue sleeve

Specifications

Item	Performance									
Category temperature range (°C)	-40 to +85									
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)									
Leakage current (µA)	Less than 0.03CV + 3 (after 5 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)									
Tangent of loss angle (tanδ)	Rated voltage (V)		6.3	10	16	25	35	50	63	100
	tanδ (max.)		0.24	0.24	0.20	0.20	0.16	0.14	0.12	0.10
0.02 is added to every 1000µF increase over 1000µF (20°C, 120Hz)										
Characteristics at high and low temperature	Rated voltage (V)		6.3	10	16	25	35	50	63	100
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2	2	2	2
Z-40°C / Z+20°C		10	8	6	4	3	3	3	3	
0.5 for -25°C, 1 for -40°C are added to every 1000µF increase over 1000µF (120Hz)										
Endurance (85°C) (Applied ripple current)	Test time		2000 hours (with the polarity inverted every 250 hours)							
	Leakage current		The initial specified value or less							
	Percentage of capacitance change		Within ±20% of initial value							
	Tangent of the loss angle		150% or less of the initial specified value							
Shelf life (85°C)	Test time : 1000 hours. Other have same as endurance. Voltage application treatment									
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)									

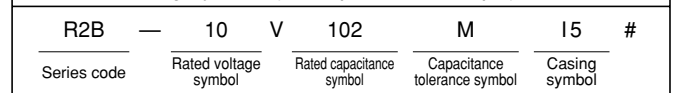
Outline Drawing



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50 · 60	120	1k	10k · 100k
6.3 to 16	0.8	1	1.1	1.2
25 to 35	0.8	1	1.5	1.7
50 to 100	0.8	1	1.6	1.9

Part numbering system (example: 10V1000µF)



Casing symbol

Case φ DxL(mm)	Casing Symbol	Case φ DxL(mm)	Casing Symbol	Case φ DxL(mm)	Casing Symbol	Case φ DxL(mm)	Casing Symbol
5x11	E3	10x12.5	H3	12.5x20	I5	16x31.5	J7
6.3x11	F3	10x16	H4	12.5x25	I6	16x35.5	J8
8x11.5	G3	10x20	H5	16x25	J6	18x35.5	K8

Standard Ratings

Rated capacitance(µF)	Rated voltage(V)		6.3		10		16		25		35		50		63		100	
	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms
0.1	—	—	—	—	—	—	—	—	—	—	—	—	5x11	4	—	—	5x11	5
0.22	—	—	—	—	—	—	—	—	—	—	—	—	5x11	7	—	—	5x11	8
0.33	—	—	—	—	—	—	—	—	—	—	—	—	5x11	8	—	—	5x11	9
0.47	—	—	—	—	—	—	—	—	—	—	—	—	5x11	10	—	—	5x11	11
1	—	—	—	—	—	—	—	—	—	—	—	—	5x11	14	—	—	5x11	16
2.2	—	—	—	—	—	—	—	—	—	—	—	—	5x11	21	5x11	23	5x11	24
3.3	—	—	—	—	—	—	—	—	—	—	—	—	5x11	26	5x11	28	6.3x11	34
4.7	—	—	—	—	—	—	—	5x11	28	5x11	28	5x11	31	5x11	34	6.3x11	41	
10	—	—	—	—	5x11	39	5x11	40	5x11	42	5x11	45	6.3x11	57	8x11.5	70		
22	—	—	5x11	52	5x11	58	5x11	60	6.3x11	71	6.3x11	77	8x11.5	89	10x16	136		
33	5x11	58	5x11	63	5x11	71	6.3x11	84	6.3x11	87	8x11.5	111	10x12.5	144	10x20	181		
47	5x11	69	5x11	75	6.3x11	97	6.3x11	100	8x11.5	122	10x12.5	157	10x16	18	12.5x20	248		
100	6.3x11	115	6.3x11	126	8x11.5	167	10x12.5	204	10x12.5	212	10x20	273	12.5x20	343	16x25	458		
220	8x11.5	202	8x11.5	221	10x12.5	294	10x16	332	10x20	375	12.5x25	506	16x25	645	18x35.5	837		
330	8x11.5	247	10x12.5	322	10x16	394	10x20	444	12.5x20	526	12.5x25	620	—	—	—	—		
470	10x12.5	350	10x16	420	10x20	513	12.5x20	607	12.5x25	685	16x25	861	—	—	—	—		
1000	10x20	611	12.5x20	767	12.5x25	935	16x25	1120	16x31.5	1270	—	—	—	—	—	—		
2200	12.5x25	1090	16x25	1380	16x31.5	1660	—	—	—	—	—	—	—	—	—	—		
3300	16x25	1490	16x31.5	1760	—	—	—	—	—	—	—	—	—	—	—	—		
4700	16x31.5	1880	18x35.5	2280	—	—	—	—	—	—	—	—	—	—	—	—		

(Note) Rated ripple current : 85°C, 120Hz

NOTE Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.

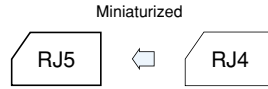
## 105°C Miniature Capacitors

GREEN CAP 105°C 1000hours Anti-cleaning solvent

- Case size is one rank smaller than Series RJ4.
- Guarantees 1000 hours at 105°C.



Marking color : White print on a black sleeve



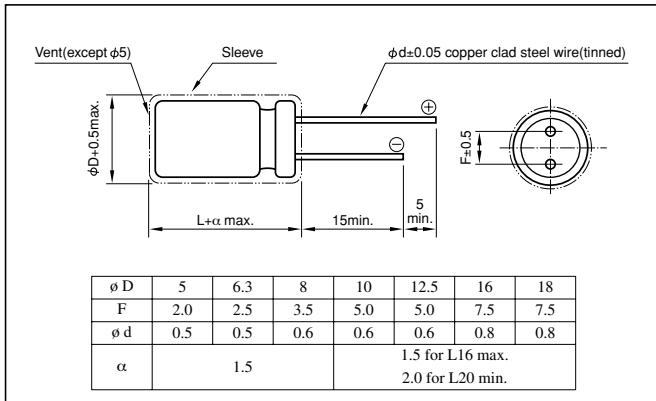
### Specifications

Item	Performance																										
Category temperature range (°C)	-55 to +105																										
Rated voltage (V)	6.3 to 100																										
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)																										
Leakage current (µA)	Less than 0.03CV or 4 whichever is larger(after 1 minute) (20°C) C: Rated capacitance(µF) V: Rated voltage(V)																										
Tangent of loss angle (tanδ)	<table border="1"> <thead> <tr> <th>Rated voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> </tr> </thead> <tbody> <tr> <td>tanδ (max.)</td> <td>0.34</td> <td>0.26</td> <td>0.20</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.10</td> <td>0.08</td> </tr> </tbody> </table> <p>0.02 is added to every 1000µF increase over 1000µF (20°C, 120Hz)</p>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	tanδ (max.)	0.34	0.26	0.20	0.16	0.14	0.12	0.10	0.08								
Rated voltage (V)	6.3	10	16	25	35	50	63	100																			
tanδ (max.)	0.34	0.26	0.20	0.16	0.14	0.12	0.10	0.08																			
Characteristics at high and low temperature	<table border="1"> <thead> <tr> <th>Rated voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Impedance ratio (max.)</td> <td>Z-25°C / Z+20°C</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>10</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> </tr> </tbody> </table> <p>(120Hz)</p>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	Impedance ratio (max.)	Z-25°C / Z+20°C	5	4	3	2	2	2	2	Z-40°C / Z+20°C	10	8	6	4	3	3	3
Rated voltage (V)	6.3	10	16	25	35	50	63	100																			
Impedance ratio (max.)	Z-25°C / Z+20°C	5	4	3	2	2	2	2																			
	Z-40°C / Z+20°C	10	8	6	4	3	3	3																			
Endurance (105°C) (Applied ripple current)	<table border="1"> <thead> <tr> <th>Test time</th> <th>1000 hours</th> </tr> </thead> <tbody> <tr> <td>Leakage current</td> <td>The initial specified value or less</td> </tr> <tr> <td>Percentage of capacitance change</td> <td>Within ±20% of initial value</td> </tr> <tr> <td>Tangent of the loss angle</td> <td>200% or less of the initial specified value</td> </tr> </tbody> </table>	Test time	1000 hours	Leakage current	The initial specified value or less	Percentage of capacitance change	Within ±20% of initial value	Tangent of the loss angle	200% or less of the initial specified value																		
Test time	1000 hours																										
Leakage current	The initial specified value or less																										
Percentage of capacitance change	Within ±20% of initial value																										
Tangent of the loss angle	200% or less of the initial specified value																										
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment																										
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)																										

Aluminum Electrolytic Capacitors Miniature

### Outline Drawing

Unit: mm



### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Rated capacitance(µF)	Frequency(Hz)					
		50 - 60	120	1k	10k	100k	
6.3 to 100	0.1 to 47	0.8	1	1.5	1.7	2.0	
	100 to 220	0.8	1	1.2	1.3	1.4	
	330 to 1000	0.8	1	1.2	1.2	1.3	
	2200 to 22000	0.8	1	1.1	1.1	1.1	

### Part numbering system (example: 10V1000µF)

RJ5	—	10	V	102	M	H3	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol

### Casing symbol

Size φ DxL(mm)	Casing Symbol	Size φ DxL(mm)	Casing Symbol
5x11	E3	12.5x25	I 6
6.3x11	F3	16x25	J 6
8x11.5	G3	16x31.5	J 7
10x12.5	H3	16x35.5	J 8
10x16	H4	18x35.5	K 8
10x20	H5	18x40	K 9
12.5x20	I 5		

Standard Ratings

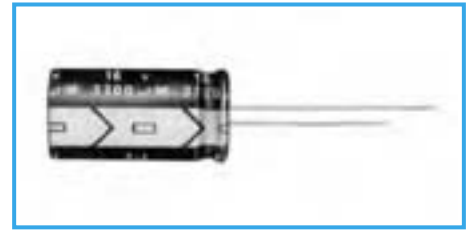
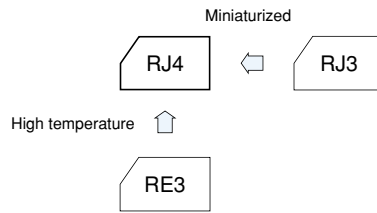
Rated capacitance(μF)	6.3		10		16		25		35		50		63		100	
	Item		Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
	∅ DxL(mm)	mArms	∅ DxL(mm)	mArms	∅ DxL(mm)	mArms	∅ DxL(mm)	mArms	∅ DxL(mm)	mArms	∅ DxL(mm)	mArms	∅ DxL(mm)	mArms	∅ DxL(mm)	mArms
0.1	—	—	—	—	—	—	—	—	—	—	5x11	3	—	—	5x11	1.5
0.22	—	—	—	—	—	—	—	—	—	—	5x11	6	—	—	5x11	3.4
0.33	—	—	—	—	—	—	—	—	—	—	5x11	9	—	—	5x11	5
0.47	—	—	—	—	—	—	—	—	—	—	5x11	10	—	—	5x11	7.1
1	—	—	—	—	—	—	—	—	—	—	5x11	15	—	—	5x11	15
2.2	—	—	—	—	—	—	—	—	—	—	5x11	22	—	—	5x11	21
3.3	—	—	—	—	—	—	—	—	—	—	5x11	27	—	—	5x11	29
4.7	—	—	—	—	—	—	—	—	—	—	5x11	32	—	—	5x11	32
10	—	—	—	—	—	—	—	—	—	—	5x11	47	—	—	5x11	50
22	—	—	—	—	—	—	—	—	—	—	5x11	70	5x11	71	6.3x11	93
33	—	—	—	—	—	—	—	—	—	—	5x11	90	6.3x11	100	8x11.5	130
47	—	—	—	—	—	—	—	—	5x11	93	6.3x11	115	6.3x11	120	8x11.5	140
68	—	—	—	—	—	—	—	—	6.3x11	110	6.3x11	150	8x11.5	155	10x12.5	190
100	—	—	—	—	—	—	5x11	125	6.3x11	151	8x11.5	190	8x11.5	200	10x16	240
220	—	—	5x11	155	6.3x11	190	6.3x11	200	8x11.5	270	10x12.5	314	10x16	335	12.5x20	390
330	—	—	6.3x11	210	6.3x11	225	8x11.5	310	10x12.5	384	10x16	421	10x20	510	—	—
470	—	—	6.3x11	250	8x11.5	323	10x12.5	429	10x16	470	10x20	540	12.5x20	640	16x25	715
1000	8x11.5	398	10x12.5	460	10x12.5	500	10x16	610	12.5x20	857	12.5x25	1000	16x25	930	18x35.5	960
2200	10x16	635	10x16	705	10x20	710	12.5x25	1180	16x25	1380	16x31.5	1410	18x35.5	1650	—	—
3300	10x20	882	12.5x20	1010	12.5x25	1200	16x25	1440	16x31.5	1500	18x35.5	1990	—	—	—	—
4700	12.5x20	1120	12.5x25	1260	16x25	1500	16x25	1570	16x35.5	1780	—	—	—	—	—	—
6800	12.5x25	1380	16x25	1570	16x25	1600	16x35.5	1850	18x40	2000	—	—	—	—	—	—
10000	16x25	1750	16x31.5	1820	16x35.5	1930	18x40	2000	—	—	—	—	—	—	—	—
15000	16x31.5	1820	16x35.5	2050	18x40	2210	—	—	—	—	—	—	—	—	—	—
22000	18x35.5	2280	18x40	2420	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 105°C, 120Hz

## 105°C Miniature Capacitors

GREEN CAP 105°C 2000hours Anti-cleaning solvent 250V Max.

- Case size is one rank smaller than Series RJ3.
- Guarantees 2000 hours at 105°C. (ø5 to ø8: 1000 hours)



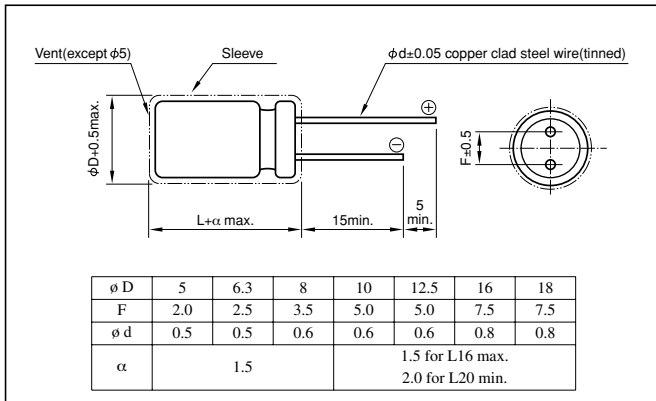
Marking color : White print on a black sleeve

### Specifications

Item	Performance																																					
	-55 to +105	-40 to +105																																				
Category temperature range (°C)	-55 to +105	-40 to +105																																				
Rated voltage (V)	6.3 to 100	160 to 450																																				
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)	±20 (20°C, 120Hz)																																				
Leakage current (µA)	Less than 0.03CV or 4 whichever is larger(after 1 minute) Less than 0.01CV or 3 whichever is larger(after 2 minutes) (20°C)	CV≤1000: Less than 0.1CV+40(after 1 minute) CV>1000: Less than 0.04CV+100(after 1 minute) (20°C)																																				
Tangent of loss angle (tanδ)	C: Rated capacitance(µF) V: Rated voltage(V)																																					
	<table border="1"> <tr> <th>Rated voltage (V)</th> <td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td> </tr> <tr> <th>tanδ (max.)</th> <td>0.28</td><td>0.24</td><td>0.20</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.08</td> </tr> </table>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	tanδ (max.)	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	<table border="1"> <tr> <th>Rated voltage (V)</th> <td>160</td><td>200</td><td>250</td><td>315</td><td>350</td><td>400</td><td>450</td> </tr> <tr> <th>tanδ (max.)</th> <td>0.20</td><td>0.20</td><td>0.20</td><td>0.24</td><td>0.24</td><td>0.24</td><td>0.24</td> </tr> </table>	Rated voltage (V)	160	200	250	315	350	400	450	tanδ (max.)	0.20	0.20	0.20	0.24	0.24	0.24	0.24		
	Rated voltage (V)	6.3	10	16	25	35	50	63	100																													
tanδ (max.)	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08																														
Rated voltage (V)	160	200	250	315	350	400	450																															
tanδ (max.)	0.20	0.20	0.20	0.24	0.24	0.24	0.24																															
0.02 is added to every 1000µF increase over 1000µF (20°C, 120Hz)		(20°C, 120Hz)																																				
Characteristics at high and low temperature	<table border="1"> <tr> <th>Rated voltage (V)</th> <td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td> </tr> <tr> <th rowspan="2">Impedance ratio (max.)</th> <td>Z-25°C / Z+20°C</td> <td>5</td><td>4</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>10</td><td>8</td><td>6</td><td>4</td><td>3</td><td>3</td><td>3</td> </tr> </table>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	Impedance ratio (max.)	Z-25°C / Z+20°C	5	4	3	2	2	2	2	Z-40°C / Z+20°C	10	8	6	4	3	3	3	<table border="1"> <tr> <th>Rated voltage (V)</th> <td>160 to 250</td><td>315 to 450</td> </tr> <tr> <th rowspan="2">Impedance ratio (max.)</th> <td>Z-25°C / Z+20°C</td> <td>4</td><td>4</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>15</td><td>10</td> </tr> </table>	Rated voltage (V)	160 to 250	315 to 450	Impedance ratio (max.)	Z-25°C / Z+20°C	4	4	Z-40°C / Z+20°C	15	10
	Rated voltage (V)	6.3	10	16	25	35	50	63	100																													
Impedance ratio (max.)	Z-25°C / Z+20°C	5	4	3	2	2	2	2																														
	Z-40°C / Z+20°C	10	8	6	4	3	3	3																														
Rated voltage (V)	160 to 250	315 to 450																																				
Impedance ratio (max.)	Z-25°C / Z+20°C	4	4																																			
	Z-40°C / Z+20°C	15	10																																			
Endurance (105°C) (Applied ripple current)	Test time	2000 hours (ø5 to ø8: 1000 hours)																																				
	Leakage current	The initial specified value or less																																				
	Percentage of capacitance change	Within ±20% of initial value																																				
	Tangent of the loss angle	200% or less of the initial specified value																																				
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment																																					
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)																																					

### Outline Drawing

Unit: mm



### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Rated capacitance(µF)	Frequency(Hz)					
		50 · 60	120	1k	10k	100k	
6.3 to 100	0.1 to 47	0.8	1	1.5	1.7	2.0	
	100 to 220	0.8	1	1.2	1.3	1.4	
	330 to 1000	0.8	1	1.2	1.2	1.3	
	2200 to 22000	0.8	1	1.1	1.1	1.1	
160 to 450	0.47 to 330	0.8	1	1.3	1.4	1.6	

### Part numbering system (example: 16V220µF)

RJ4	—	16	V	222	M	I5	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

### Casing symbol

Size ø DxL(mm)	Casing Symbol	Size ø DxL(mm)	Casing Symbol
5x11	E3	12.5x25	I6
6.3x11	F3	16x25	J6
8x11.5	G3	16x31.5	J7
10x12.5	H3	16x35.5	J8
10x16	H4	18x31.5	K7
10x20	H5	18x35.5	K8
12.5x20	I5	18x40	K9

Standard Ratings

Rated voltage (V)	Item	6.3			10			16			25			35			50			63			100													
		Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current											
		φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms											
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	1990	3	—	—	—	5x11	1327	1.5												
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	905	6	—	—	—	5x11	603	3.4												
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	603	9	—	—	—	5x11	402	5												
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	424	10	—	—	—	5x11	282	7.1												
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	199	15	—	—	—	5x11	133	15												
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	90.5	22	—	—	—	5x11	60.3	21												
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	60.3	27	—	—	—	5x11	40.2	29												
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	56.5	27	5x11	49.4	30	5x11	42.4	32	—	—	—	5x11	28.2	32						
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	33.2	37	5x11	26.5	39	5x11	23.2	43	5x11	19.9	47	5x11	16.6	46	6.3x11	13.3	54			
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	15.1	54	5x11	12.1	58	5x11	10.6	64	5x11	9.05	70	5x11	7.54	71	6.3x11	6.03	93			
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	10.1	67	5x11	8.04	71	5x11	7.04	78	5x11	6.03	90	6.3x11	5.03	100	8x11.5	4.02	130			
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	8.47	72	5x11	7.06	79	5x11	5.65	84	5x11	4.94	90	6.3x11	4.24	115	6.3x11	3.53	120	10x12.5	2.82	165
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	3.98	105	5x11	3.32	115	6.3x11	2.65	141	6.3x11	2.32	151	8x11.5	1.99	190	10x12.5	1.66	215	10x20	1.33	265
220	5x11	2.11	140	6.3x11	1.81	166	6.3x11	1.51	190	8x11.5	1.21	247	10x12.5	1.06	314	10x12.5	0.91	314	10x16	0.75	335	12.5x25	0.60	440												
330	6.3x11	1.41	195	6.3x11	1.21	210	8x11.5	1.01	271	10x12.5	0.81	360	10x12.5	0.70	384	10x16	0.60	421	10x20	0.50	510	12.5x25	0.40	540												
470	6.3x11	0.99	232	8x11.5	0.85	325	8x11.5	0.71	323	10x12.5	0.57	429	10x16	0.50	470	12.5x20	0.42	628	12.5x20	0.35	640	16x25	0.28	715												
1000	8x11.5	0.47	398	10x12.5	0.40	457	10x16	0.33	560	10x20	0.27	705	12.5x20	0.23	857	12.5x25	0.20	1000	16x25	0.17	930	18x40	0.13	985												
2200	10x20	0.23	720	10x20	0.20	761	12.5x20	0.17	961	12.5x25	0.14	1180	16x25	0.12	1380	16x35.5	0.11	1660	—	—	—	—	—	—												
3300	10x20	0.16	882	12.5x20	0.14	1010	12.5x25	0.12	1200	16x25	0.10	1440	16x35.5	0.09	1780	18x35.5	0.08	1990	—	—	—	—	—	—												
4700	12.5x20	0.12	1120	12.5x25	0.11	1250	16x25	0.09	1490	16x31.5	0.08	1880	18x35.5	0.07	2120	—	—	—	—	—	—	—	—	—												
6800	12.5x25	0.09	1380	16x25	0.08	1570	16x35.5	0.07	1830	18x35.5	0.06	2330	—	—	—	—	—	—	—	—	—	—	—	—												
10000	16x25	0.07	1750	16x35.5	0.07	1910	18x35.5	0.06	2220	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—												
15000	16x35.5	0.06	2040	18x35.5	0.06	2190	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—												
22000	18x40	0.05	2390	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—												

Aluminum Electrolytic Capacitors Miniature

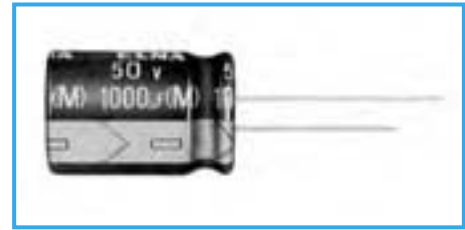
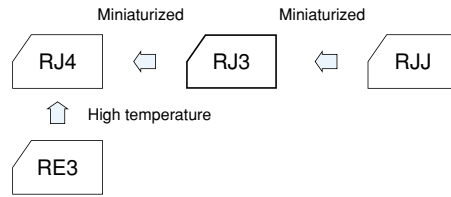
Rated voltage (V)	Item	160			200			250			315			350			400			450			
		Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	
		φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	φD x L (mm)	Ω	mArms	
0.47	6.3x11	706	11	6.3x11	706	11	6.3x11	706	11	6.3x11	847	11	6.3x11	847	11	6.3x11	847	11	8x11.5	847	13		
1	6.3x11	332	16	6.3x11	332	16	6.3x11	332	16	6.3x11	398	16	6.3x11	398	16	6.3x11	398	16	8x11.5	398	18		
2.2	6.3x11	151	23	6.3x11	151	23	6.3x11	151	23	8x11.5	181	27	8x11.5	181	27	8x11.5	181	27	10x12.5	181	31		
3.3	6.3x11	101	28	6.3x11	101	28	8x11.5	101	34	10x12.5	121	38	10x12.5	121	38	10x12.5	121	38	10x16	121	42		
4.7	6.3x11	70.6	34	8x11.5	70.6	40	8x11.5	70.6	40	10x12.5	84.7	45	10x12.5	84.7	45	10x16	84.7	50	10x20	84.7	54		
10	8x11.5	33.2	58	10x12.5	33.2	66	10x16	33.2	74	10x20	39.8	79	10x20	39.8	79	12.5x20	39.8	87	12.5x20	39.8	87		
22	10x16	15.1	107	10x20	15.1	120	12.5x20	15.1	130	12.5x20	18.1	129	12.5x25	18.1	140	12.5x25	18.1	140	16x25	18.1	160		
33	10x20	10.1	143	12.5x20	10.1	160	12.5x25	10.1	172	16x25	12.1	196	16x25	12.1	196	16x25	12.1	196	16x31.5	12.1	215		
47	12.5x20	7.06	188	12.5x20	7.06	188	12.5x25	7.06	205	16x25	8.47	234	16x25	8.47	234	16x31.5	8.47	256	16x35.5	8.47	269		
100	12.5x25	3.32	299	16x25	3.32	342	16x31.5	3.32	374	18x31.5	3.98	401	18x31.5	3.98	401	—	—	—	—	—	—	—	
220	16x31.5	1.51	554	18x35.5	1.51	624	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
330	18x35.5	1.01	764	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) ESR : 20°C, 120Hz ; Rated ripple current : 105°C, 120Hz

### 105°C Use, Standard Capacitors

GREEN CAP    105°C 2000hours    Anti-cleaning solvent 250V Max.

• Guarantees 2000 hours at 105°C (ø5~8: 1000 hours).



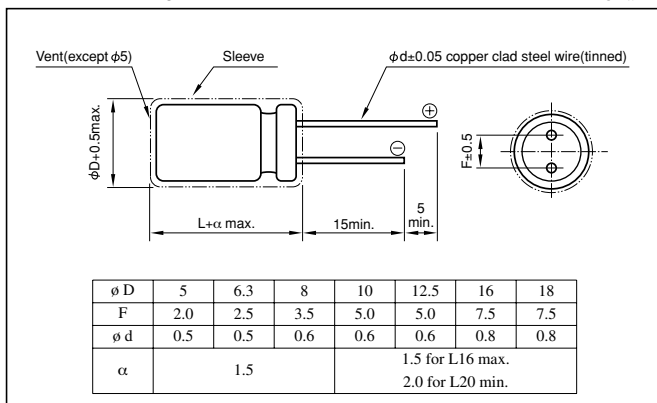
Marking color : White print on a black sleeve

### Specifications

Item	Performance																																					
Category temperature range (°C)	-55 to +105	-40 to +105																																				
Rated voltage (V)	6.3 to 100	160 to 450																																				
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)	±20 (20°C, 120Hz)																																				
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) (20°C)	CV≤1000: Less than 0.1CV+40 (after 1 minute) CV>1000: Less than 0.04CV+100 (after 1 minute) (20°C)																																				
Tangent of loss angle (tanδ)	C: Rated capacitance(µF) V: Rated voltage(V)																																					
	<table border="1"> <tr> <th>Rated voltage (V)</th> <td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td> </tr> <tr> <th>tanδ (max.)</th> <td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.09</td><td>0.08</td> </tr> </table> <p>0.02 is added to every 1000µF increase over 1000µF (20°C, 120Hz)</p>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	tanδ (max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08	<table border="1"> <tr> <th>Rated voltage (V)</th> <td>160</td><td>200</td><td>250</td><td>315</td><td>350</td><td>400</td> </tr> <tr> <th>tanδ (max.)</th> <td>0.15</td><td>0.15</td><td>0.15</td><td>0.20</td><td>0.20</td><td>0.20</td> </tr> </table> <p>(20°C, 120Hz)</p>	Rated voltage (V)	160	200	250	315	350	400	tanδ (max.)	0.15	0.15	0.15	0.20	0.20	0.20				
Rated voltage (V)	6.3	10	16	25	35	50	63	100																														
tanδ (max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08																														
Rated voltage (V)	160	200	250	315	350	400																																
tanδ (max.)	0.15	0.15	0.15	0.20	0.20	0.20																																
Characteristics at high and low temperature	<table border="1"> <tr> <th>Rated voltage (V)</th> <td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td> </tr> <tr> <th rowspan="2">Impedance ratio (max.)</th> <td>Z-25°C / Z+20°C</td> <td>5</td><td>4</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td> </tr> <tr> <td>Z-55°C / Z+20°C</td> <td>10</td><td>8</td><td>6</td><td>4</td><td>3</td><td>3</td><td>3</td> </tr> </table> <p>(120Hz)</p>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	Impedance ratio (max.)	Z-25°C / Z+20°C	5	4	3	2	2	2	2	Z-55°C / Z+20°C	10	8	6	4	3	3	3	<table border="1"> <tr> <th>Rated voltage (V)</th> <td>160 to 250</td><td>315 to 400</td> </tr> <tr> <th rowspan="2">Impedance ratio (max.)</th> <td>Z-25°C / Z+20°C</td> <td>3</td><td>3</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>8</td><td>6</td> </tr> </table> <p>(120Hz)</p>	Rated voltage (V)	160 to 250	315 to 400	Impedance ratio (max.)	Z-25°C / Z+20°C	3	3	Z-40°C / Z+20°C	8	6
	Rated voltage (V)	6.3	10	16	25	35	50	63	100																													
Impedance ratio (max.)	Z-25°C / Z+20°C	5	4	3	2	2	2	2																														
	Z-55°C / Z+20°C	10	8	6	4	3	3	3																														
Rated voltage (V)	160 to 250	315 to 400																																				
Impedance ratio (max.)	Z-25°C / Z+20°C	3	3																																			
	Z-40°C / Z+20°C	8	6																																			
Endurance (105°C) (Applied ripple current)	Test time	2000 hours (ø5 to ø8: 1000 hours)																																				
	Leakage current	The initial specified value or less																																				
	Percentage of capacitance change	Within ±20% of initial value																																				
	Tangent of the loss angle	200% or less of the initial specified value																																				
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment																																					
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)																																					

### Outline Drawing

Unit: mm



### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Rated capacitance(µF)	Frequency(Hz)					
		50 · 60	120	1k	10k	100k	
6.3 to 100	0.1 to 4.7	—	0.4	0.7	0.8	1	
	10 to 47	—	0.5	0.8	0.9	1	
	100 to 220	—	0.7	0.9	0.9	1	
	330 to 1000	—	0.8	0.9	1.0	1	
	2200 to 15000	—	0.9	1.0	1	1	
160 to 400	0.47 to 220	0.8	1	1.3	1.4	1.6	

### Part numbering system (example: 63V100µF)

RJ3	—	63	V	102	M	J7	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

### Casing symbol

Size ø DxL(mm)	Casing Symbol	Size ø DxL(mm)	Casing Symbol
5x11	E3	12.5x25	I 6
6.3x11	F3	16x25	J 6
8x11.5	G3	16x31.5	J 7
10x12.5	H3	16x35.5	J 8
10x16	H4	18x35.5	K8
10x20	H5	18x40	K9
12.5x20	I 5		

Standard Ratings

Rated voltage(V) Rated Capacitance(μF)	Item	6.3				10				16				25			
		Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current
		∅ DxL(mm)	Ω	Ω	mArms	∅ DxL(mm)	Ω	Ω	mArms	∅ DxL(mm)	Ω	Ω	mArms	∅ DxL(mm)	Ω	Ω	mArms
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	49.4	3.0	85
10	—	—	—	—	—	—	—	—	—	5x11	26.5	2.5	92	5x11	23.2	2.5	92
22	—	—	—	—	5x11	14.3	2.5	92	5x11	12.1	1.9	105	5x11	10.6	1.9	105	
33	5x11	11.1	2.5	105	5x11	9.55	1.9	105	5x11	8.04	1.5	120	5x11	7.04	1.5	120	
47	5x11	7.77	1.5	120	5x11	6.71	1.5	120	5x11	5.65	1.2	130	5x11	4.94	1.2	130	
100	5x11	3.65	1.2	130	5x11	3.15	1.2	130	6.3x11	2.65	0.58	220	6.3x11	2.32	0.58	220	
220	6.3x11	1.66	0.87	180	6.3x11	1.43	0.58	220	8x11.5	1.21	0.47	290	8x11.5	1.06	0.39	315	
330	6.3x11	1.11	0.58	220	8x11.5	0.96	0.47	265	8x11.5	0.81	0.39	315	10x12.5	0.70	0.23	500	
470	8x11.5	0.78	0.39	315	8x11.5	0.67	0.39	315	10x12.5	0.57	0.23	500	10x16	0.50	0.18	615	
1000	10x12.5	0.37	0.23	500	10x16	0.32	0.18	615	10x20	0.27	0.12	825	12.5x20	0.23	0.090	1050	
2200	12.5x20	0.18	0.095	1000	12.5x20	0.16	0.090	1050	12.5x25	0.14	0.068	1300	16x25	0.12	0.056	1740	
3300	12.5x20	0.13	0.090	1050	12.5x25	0.12	0.068	1300	16x25	0.10	0.056	1740	16x31.5	0.09	0.045	2110	
4700	16x25	0.10	0.061	1670	16x25	0.09	0.056	1740	16x31.5	0.08	0.045	2110	18x35.5	0.07	0.036	2580	
6800	16x25	0.08	0.056	1740	16x31.5	0.07	0.045	2110	18x35.5	0.06	0.036	2580	—	—	—	—	
10000	16x31.5	0.06	0.045	2110	18x35.5	0.06	0.036	2580	—	—	—	—	—	—	—	—	
15000	18x35.5	0.05	0.036	2580	—	—	—	—	—	—	—	—	—	—	—	—	

Rated voltage(V) Rated Capacitance(μF)	Item	35				50				63				100			
		Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current	Case	ESR	Impedance	Rated ripple current
		∅ DxL(mm)	Ω	Ω	mArms	∅ DxL(mm)	Ω	Ω	mArms	∅ DxL(mm)	Ω	Ω	mArms	∅ DxL(mm)	Ω	Ω	mArms
0.1	—	—	—	—	5x11	1659	18	10	—	—	—	—	—	—	—	—	
0.22	—	—	—	—	5x11	754	13	15	—	—	—	—	—	—	—	—	
0.33	—	—	—	—	5x11	503	10	18	—	—	—	—	—	—	—	—	
0.47	—	—	—	—	5x11	353	7.0	23	—	—	—	—	5x11	282	13	30	
1	—	—	—	—	5x11	166	4.9	35	—	—	—	—	5x11	133	11	45	
2.2	—	—	—	—	5x11	75.4	4.2	53	—	—	—	—	5x11	60.3	9.2	60	
3.3	—	—	—	—	5x11	50.3	3.9	65	—	—	—	—	5x11	40.2	7.2	67	
4.7	5x11	42.4	2.5	92	5x11	35.3	3.6	82	5x11	31.8	5.8	74	5x11	28.2	6.3	75	
10	5x11	19.9	1.9	105	5x11	16.6	2.7	100	5x11	14.9	3.6	95	6.3x11	13.3	3.3	110	
22	5x11	9.05	1.5	120	5x11	7.54	1.9	125	6.3x11	6.79	2.1	130	8x11.5	6.03	1.4	165	
33	5x11	6.03	1.2	130	6.3x11	5.03	1.1	195	6.3x11	4.52	1.7	160	10x12.5	4.02	0.94	305	
47	6.3x11	4.24	0.58	220	6.3x11	3.53	0.90	245	8x11.5	3.18	1.2	305	10x16	2.82	0.68	320	
100	8x11.5	1.99	0.39	315	8x11.5	1.66	0.50	385	10x12.5	1.49	0.65	395	12.5x20	1.33	0.28	585	
220	10x12.5	0.91	0.23	500	10x16	0.75	0.27	505	10x20	0.68	0.32	505	16x25	0.60	0.16	1120	
330	10x16	0.60	0.18	615	10x20	0.50	0.18	675	12.5x20	0.45	0.22	660	16x25	0.40	0.13	1290	
470	10x20	0.42	0.12	825	12.5x20	0.35	0.12	895	12.5x25	0.32	0.16	850	16x31.5	0.28	0.11	1350	
1000	12.5x25	0.20	0.068	1300	16x25	0.17	0.076	1495	16x31.5	0.15	0.098	1430	—	—	—	—	
2200	16x31.5	0.11	0.045	2110	18x35.5	0.09	0.050	2190	—	—	—	—	—	—	—	—	
3300	18x35.5	0.08	0.036	2580	—	—	—	—	—	—	—	—	—	—	—	—	

(Note) ESR : 20°C, 120Hz ; Impedance : 20°C, 100kHz ; Rated ripple current : 105°C, 100kHz

Rated voltage(V) Rated Capacitance(μF)	Item	160			200			250			315			350			400		
		Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current	Case	ESR	Rated ripple current
		∅D x L (mm)	Ω	mArms	∅D x L (mm)	Ω	mArms	∅D x L (mm)	Ω	mArms	∅D x L (mm)	Ω	mArms	∅D x L (mm)	Ω	mArms	∅D x L (mm)	Ω	mArms
0.47	6.3x11	529	12	6.3x11	529	12	6.3x11	529	12	6.3x11	705	11	6.3x11	705	11	—	—	—	
1	6.3x11	248	18	6.3x11	248	18	6.3x11	248	18	6.3x11	331	16	6.3x11	331	18	8x11.5	331	18	
2.2	6.3x11	113	26	6.3x11	113	26	8x11.5	113	30	8x11.5	150	27	8x11.5	150	30	10x12.5	150	30	
3.3	8x11.5	75.4	37	8x11.5	75.4	37	10x12.5	75.4	43	10x12.5	100	36	10x12.5	100	36	10x16	100	40	
4.7	8x11.5	52.9	44	10x12.5	52.9	50	10x12.5	52.9	50	10x16	70.6	47	10x16	70.6	47	10x20	70.6	52	
10	10x12.5	24.9	75	10x16	24.9	80	10x20	24.9	90	10x20	33.2	75	12.5x20	33.2	79	12.5x20	33.2	79	
22	10x20	11.3	135	10x20	11.3	135	12.5x25	11.3	155	12.5x25	15.1	130	12.5x25	15.1	130	16x25	15.1	130	
33	12.5x20	7.54	175	12.5x25	7.54	190	12.5x25	7.54	190	16x25	10.1	160	16x25	10.1	160	16x31.5	10.1	175	
47	12.5x25	5.29	230	12.5x25	5.29	230	16x25	5.29	225	16x31.5	7.06	210	16x31.5	7.06	210	18x35.5	7.06	220	
100	16x25	2.49	330	16x31.5	2.49	360	18x35.5	2.49	340	18x40	3.32	335	18x40	3.32	335	—	—	—	
220	18x35.5	1.13	500	18x40	1.13	525	—	—	—	—	—	—	—	—	—	—	—	—	

(Note) ESR : 20°C, 120Hz ; Rated ripple current : 105°C, 120Hz

## 105°C Use, High-Reliability, Low Impedance Capacitors

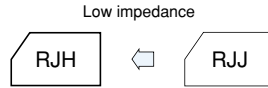
GREEN  
CAP

Low  
Impedance

105°C  
5000hours

Anti-  
cleaning  
solvent

- The capacitor of this Series achieves high reliability under the environmental loading prevailing in a piece of equipment on which it is mounted.
- Guarantees 5000 hours at 105°C.  
(ø 5 to 6.3: 2000 hours ; ø 8 to 10: 3000 hours)



Marking color : White print on a black sleeve

### Specifications

Item	Performance																										
Category temperature range (°C)	-55 to +105																										
Tolerance at rated capacitance (%)	±20 <span style="float: right;">(20°C, 120Hz)</span>																										
Leakage current (µA)	Less than 0.01CV + 2 (after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) <span style="float: right;">(20°C)</span>																										
Tangent of loss angle (tanδ)	<table border="1" style="width: 100%; border-collapse: collapse; font-size: 8px;"> <tr> <td style="width: 15%;">Rated voltage (V)</td> <td style="width: 10%;">6.3</td> <td style="width: 10%;">10</td> <td style="width: 10%;">16</td> <td style="width: 10%;">25</td> <td style="width: 10%;">35</td> <td style="width: 10%;">50</td> <td style="width: 10%;">63</td> <td style="width: 10%;">100</td> </tr> <tr> <td>tanδ (max.)</td> <td>0.22</td> <td>0.19</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.10</td> <td>0.08</td> <td>0.07</td> </tr> </table>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	tanδ (max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.08	0.07								
	Rated voltage (V)	6.3	10	16	25	35	50	63	100																		
tanδ (max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.08	0.07																			
0.02 is added to every 1000µF increase over 1000µF. <span style="float: right;">(20°C, 120Hz)</span>																											
Characteristics at high and low temperature	<table border="1" style="width: 100%; border-collapse: collapse; font-size: 8px;"> <tr> <td style="width: 15%;">Rated voltage (V)</td> <td style="width: 10%;">6.3</td> <td style="width: 10%;">10</td> <td style="width: 10%;">16</td> <td style="width: 10%;">25</td> <td style="width: 10%;">35</td> <td style="width: 10%;">50</td> <td style="width: 10%;">63</td> <td style="width: 10%;">100</td> </tr> <tr> <td rowspan="2">Impedance ratio (max.)</td> <td>Z-25°C / Z+20°C</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z-55°C / Z+20°C</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </table>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	Impedance ratio (max.)	Z-25°C / Z+20°C	2	2	2	2	2	2	2	Z-55°C / Z+20°C	3	3	3	3	3	3	3
	Rated voltage (V)	6.3	10	16	25	35	50	63	100																		
Impedance ratio (max.)	Z-25°C / Z+20°C	2	2	2	2	2	2	2																			
	Z-55°C / Z+20°C	3	3	3	3	3	3	3																			
(120Hz)																											
Endurance (105°C) (Applied ripple current)	<table border="1" style="width: 100%; border-collapse: collapse; font-size: 8px;"> <tr> <td style="width: 40%;">Test time</td> <td style="width: 60%;">5000 hours (ø 5 to 6.3: 2000 hours) (ø 8 to 10 : 3000 hours)</td> </tr> <tr> <td>Leakage current</td> <td>The initial specified value or less</td> </tr> <tr> <td>Percentage of capacitance change</td> <td>Within ±20% of initial value</td> </tr> <tr> <td>Tangent of the loss angle</td> <td>200% or less of the initial specified value</td> </tr> </table>	Test time	5000 hours (ø 5 to 6.3: 2000 hours) (ø 8 to 10 : 3000 hours)	Leakage current	The initial specified value or less	Percentage of capacitance change	Within ±20% of initial value	Tangent of the loss angle	200% or less of the initial specified value																		
	Test time	5000 hours (ø 5 to 6.3: 2000 hours) (ø 8 to 10 : 3000 hours)																									
	Leakage current	The initial specified value or less																									
	Percentage of capacitance change	Within ±20% of initial value																									
Tangent of the loss angle	200% or less of the initial specified value																										
Shelf life (105°C)	<table border="1" style="width: 100%; border-collapse: collapse; font-size: 8px;"> <tr> <td style="width: 40%;">Test time</td> <td style="width: 60%;">1000 hours</td> </tr> <tr> <td>Leakage current</td> <td>The initial specified value or less</td> </tr> <tr> <td>Percentage of capacitance change</td> <td>Within ±15% of initial value</td> </tr> <tr> <td>Tangent of the loss angle</td> <td>150% or less of the initial specified value</td> </tr> </table>	Test time	1000 hours	Leakage current	The initial specified value or less	Percentage of capacitance change	Within ±15% of initial value	Tangent of the loss angle	150% or less of the initial specified value																		
	Test time	1000 hours																									
	Leakage current	The initial specified value or less																									
	Percentage of capacitance change	Within ±15% of initial value																									
Tangent of the loss angle	150% or less of the initial specified value																										
Voltage application treatment																											
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)																										

Miniature Aluminum Electrolytic Capacitors

### Outline Drawing

Unit: mm

ø D	5	6.3	8	10	12.5	16	18
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
ø d	0.5	0.5/0.6	0.6	0.6	0.6	0.8	0.8
α	1.0	1.0	1.0	2.0	2.0	2.0	2.0

### Coefficient of Frequency for Rated Ripple Current

Rated capacitance(µF)	Frequency(Hz)			
	120	1k	10k	100k
0.47 to 4.7	0.40	0.68	0.78	1
5.6 to 47	0.50	0.76	0.87	1
56 to 270	0.70	0.85	0.90	1
330 to 1000	0.80	0.93	0.98	1
1200 to 15000	0.90	0.95	1	1

### Part numbering system (example: 10V5600µF)

RJH	—	10	V	562	M	J7	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

- The electric characteristics are described on page 118.



Standard Ratings

Rated voltage(V)		6.3					10					
Case ø DxL(mm)	Casing symbol	Item	Rated capacitance	ESR	Impedance Ω/100kHz		Rated ripple current	Rated capacitance	ESR	Impedance Ω/100kHz		Rated ripple current
			μF	Ω	20°C	-10°C	mArms	μF	Ω	20°C	-10°C	mArms
5x11.5	E3		100	3.65	0.65	1.46	175	82	3.84	0.65	1.46	175
5x15	E4		150	2.43	0.46	1.04	235	100	3.15	0.46	1.04	235
6.3x11.5	F3		220	1.66	0.31	0.70	290	180	1.75	0.31	0.70	290
6.3x15	F4		330	1.11	0.20	0.45	400	220	1.43	0.20	0.45	400
8x12	G3		470	0.777	0.17	0.38	488	330	0.956	0.17	0.38	488
8x15	G4		680	0.537	0.13	0.29	617	470	0.671	0.13	0.29	617
8x20	G5		1000	0.365	0.095	0.21	800	680	0.464	0.095	0.21	800
10x12.5	H3		680	0.537	0.1	0.23	625	470	0.671	0.10	0.23	625
10x16	H4		820	0.446	0.08	0.18	825	560	0.563	0.080	0.18	825
10x20	H5		1200	0.305	0.062	0.14	1010	1000	0.316	0.062	0.14	1010
10x25	H6		1500	0.244	0.052	0.12	1190	1200	0.263	0.052	0.12	1190
10x30	H7		2200	0.181	0.044	0.099	1440	1500	0.211	0.044	0.099	1440
12.5x15	I4	•	1200	0.305	0.062	0.14	1010	• 1000	0.316	0.062	0.14	1010
12.5x20	I5		2200	0.181	0.042	0.095	1400	1800	0.176	0.042	0.095	1400
12.5x25	I6		2700	0.148	0.034	0.076	1690	2200	0.159	0.034	0.076	1690
12.5x30	I7		3900	0.111	0.03	0.068	1950	2700	0.130	0.030	0.068	1950
12.5x35	I8		4700	0.099	0.024	0.054	2220	3300	0.116	0.024	0.054	2220
12.5x40	I9		5600	0.089	0.021	0.047	2390	3900	0.098	0.021	0.047	2390
16x16	J4	•	2700	0.148	0.046	0.10	1310	• 1800	0.176	0.046	0.10	1310
16x20	J5	•	4700	0.099	0.034	0.077	1660	• 3300	0.116	0.034	0.077	1660
16x25	J6		5600	0.089	0.028	0.063	2070	3900	0.098	0.028	0.063	2070
16x31.5	J7		6800	0.079	0.025	0.056	2350	5600	0.080	0.025	0.056	2350
16x35.5	J8		8200	0.073	0.022	0.050	2550	6800	0.071	0.022	0.050	2550
16x40	J9		12000	0.059	0.018	0.041	2970	8200	0.067	0.018	0.041	2970
18x16	K4	•	3300	0.131	0.043	0.097	1460	• 2200	0.159	0.043	0.097	1460
18x20	K5	•	5600	0.089	0.030	0.068	1850	• 3900	0.098	0.030	0.068	1850
18x25	K6	•	6800	0.079	0.027	0.061	2120	• 4700	0.089	0.027	0.061	2120
18x31.5	K7		10000	0.064	0.023	0.052	2410	6800	0.071	0.023	0.052	2410
18x35.5	K8		12000	0.059	0.019	0.043	2680	8200	0.067	0.019	0.043	2680
18x40	K9		15000	0.054	0.017	0.038	3010	10000	0.059	0.017	0.038	3010

Miniature Aluminum Electrolytic Capacitors

Rated voltage(V)		16					25					
Case ø DxL(mm)	Casing symbol	Item	Rated capacitance	ESR	Impedance Ω/100kHz		Rated ripple current	Rated capacitance	ESR	Impedance Ω/100kHz		Rated ripple current
			μF	Ω	20°C	-10°C	mArms	μF	Ω	20°C	-10°C	mArms
5x11.5	E3		56	4.74	0.65	1.46	175	39	5.96	0.65	1.46	175
5x15	E4		82	3.24	0.46	1.04	235	56	4.15	0.46	1.04	235
6.3x11.5	F3		120	2.21	0.31	0.70	290	82	2.83	0.31	0.70	290
6.3x15	F4		180	1.48	0.20	0.45	400	120	1.94	0.20	0.45	400
8x12	G3		270	0.983	0.17	0.38	488	180	1.29	0.17	0.38	488
8x15	G4		330	0.805	0.13	0.29	617	220	1.06	0.13	0.29	617
8x20	G5		470	0.565	0.095	0.21	800	330	0.704	0.095	0.21	800
10x12.5	H3		330	0.805	0.10	0.23	625	220	1.06	0.10	0.23	625
10x16	H4		390	0.681	0.080	0.18	825	270	0.861	0.080	0.18	825
10x20	H5		680	0.391	0.062	0.14	1010	470	0.495	0.062	0.14	1010
10x25	H6		820	0.324	0.052	0.12	1190	560	0.415	0.052	0.12	1190
10x30	H7		1200	0.222	0.044	0.099	1440	820	0.284	0.044	0.099	1440
12.5x15	I4	•	680	0.391	0.062	0.14	1010	• 470	0.495	0.062	0.14	1010
12.5x20	I5		1200	0.222	0.042	0.095	1400	820	0.284	0.042	0.095	1400
12.5x25	I6		1500	0.177	0.034	0.076	1690	1000	0.233	0.034	0.076	1690
12.5x30	I7		2200	0.136	0.030	0.068	1950	1500	0.155	0.030	0.068	1950
12.5x35	I8		2700	0.111	0.024	0.054	2220	1800	0.130	0.024	0.054	2220
12.5x40	I9		3300	0.101	0.021	0.047	2390	2200	0.121	0.021	0.047	2390
16x16	J4	•	1500	0.177	0.046	0.10	1310	• 820	0.284	0.046	0.10	1310
16x20	J5	•	2200	0.136	0.034	0.077	1660	• 1500	0.155	0.034	0.077	1660
16x25	J6		2700	0.111	0.028	0.063	2070	1800	0.130	0.028	0.063	2070
16x31.5	J7		3900	0.086	0.025	0.056	2350	2700	0.099	0.025	0.056	2350
16x35.5	J8		4700	0.078	0.022	0.050	2550	3300	0.091	0.022	0.050	2550
16x40	J9		5600	0.072	0.018	0.041	2970	3900	0.077	0.018	0.041	2970
18x16	K4	•	1500	0.177	0.043	0.097	1460	• 1200	0.194	0.043	0.097	1460
18x20	K5	•	2700	0.111	0.030	0.068	1850	• 1800	0.130	0.030	0.068	1850
18x25	K6	•	3900	0.086	0.027	0.061	2120	• 2700	0.099	0.027	0.061	2120
18x31.5	K7		4700	0.078	0.023	0.052	2410	3300	0.091	0.023	0.052	2410
18x35.5	K8		6800	0.064	0.019	0.043	2680	3900	0.077	0.019	0.043	2680
18x40	K9		8200	0.061	0.017	0.038	3010	4700	0.071	0.017	0.038	3010

(Note) ESR : 20°C, 120Hz ; Rated ripple current : 105°C, 100kHz

• : The black circles in the capacitance column denote semi-standard products.

• The standard ratings follow the next page.

NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

### Standard Ratings

Case ø DxL(mm)	Casing symbol	Item	35					50				
			Rated capacitance μF	ESR Ω	Impedance Ω/100kHz		Rated ripple current mA <sub>rms</sub>	Rated capacitance μF	ESR Ω	Impedance Ω/100kHz		Rated ripple current mA <sub>rms</sub>
					20°C	-10°C				20°C	-10°C	
5x11.5	E3	—	—	—	—	—	0.47	353	3.9	7.8	22	
5x11.5	E3	—	—	—	—	—	1	166	3.5	7.0	36	
5x11.5	E3	—	—	—	—	—	2.2	75.4	3.0	6.0	54	
5x11.5	E3	—	—	—	—	—	3.3	50.3	2.6	5.2	63	
5x11.5	E3	—	—	—	—	—	4.7	35.3	2.2	4.4	75	
5x11.5	E3	—	—	—	—	—	10	16.6	1.4	2.8	110	
5x11.5	E3	27	7.37	0.65	1.46	175	18	9.22	0.95	1.9	120	
5x15	E4	39	5.10	0.46	1.04	235	27	6.14	0.66	1.32	135	
6.3x11.5	F3	56	3.56	0.31	0.70	290	39	4.25	0.43	0.86	148	
6.3x15	F4	82	2.43	0.20	0.45	400	56	2.96	0.33	0.66	153	
8x12	G3	120	1.66	0.17	0.38	488	68	2.44	0.20	0.40	360	
8x15	G4	180	1.11	0.13	0.29	617	82	2.02	0.18	0.36	460	
8x20	G5	220	0.905	0.095	0.21	800	120	1.38	0.13	0.26	670	
10x12.5	H3	150	1.33	0.10	0.23	625	82	2.02	0.18	0.36	443	
10x16	H4	180	1.11	0.080	0.18	825	100	1.66	0.15	0.30	553	
10x20	H5	330	0.604	0.062	0.14	1010	180	0.922	0.085	0.17	676	
10x25	H6	390	0.511	0.052	0.12	1190	220	0.754	0.075	0.15	876	
10x30	H7	560	0.356	0.044	0.099	1440	330	0.503	0.055	0.110	1010	
12.5x15	I4	• 330	0.604	0.062	0.140	1010	• 180	0.922	0.095	0.190	745	
12.5x20	I5	560	0.356	0.042	0.095	1400	330	0.503	0.060	0.120	979	
12.5x25	I6	680	0.293	0.034	0.076	1690	470	0.353	0.044	0.088	1180	
12.5x30	I7	1000	0.200	0.030	0.068	1950	560	0.297	0.040	0.080	1310	
12.5x35	I8	1200	0.166	0.024	0.054	2220	680	0.244	0.036	0.072	1470	
12.5x40	I9	1500	0.133	0.021	0.047	2390	820	0.203	0.034	0.068	1590	
16x16	J4	• 560	0.356	0.046	0.10	1310	• 330	0.503	0.065	0.130	982	
16x20	J5	• 1000	0.200	0.034	0.077	1660	• 680	0.244	0.045	0.090	1210	
16x25	J6	1200	0.166	0.028	0.063	2070	820	0.203	0.038	0.076	1490	
16x31.5	J7	1800	0.111	0.025	0.056	2350	1000	0.166	0.032	0.064	1890	
16x35.5	J8	2200	0.106	0.022	0.050	2550	1200	0.139	0.028	0.056	2140	
16x40	J9	2700	0.087	0.018	0.041	2970	1500	0.111	0.026	0.052	2410	
18x16	K4	• 680	0.293	0.043	0.097	1460	• 470	0.353	0.048	0.096	1180	
18x20	K5	• 1200	0.166	0.030	0.068	1850	• 820	0.203	0.036	0.072	1450	
18x25	K6	• 1800	0.111	0.027	0.061	2120	• 1000	0.166	0.032	0.064	1720	
18x31.5	K7	2200	0.106	0.023	0.052	2410	1500	0.111	0.026	0.052	1970	
18x35.5	K8	2700	0.087	0.019	0.043	2680	1800	0.074	0.025	0.050	2310	
18x40	K9	3300	0.081	0.017	0.038	3010	2200	0.073	0.024	0.048	2530	

Miniature Aluminum Electrolytic Capacitors

Case ø DxL(mm)	Casing symbol	Item	63					100				
			Rated capacitance μF	ESR Ω	Impedance Ω/100kHz		Rated ripple current mA <sub>rms</sub>	Rated capacitance μF	ESR Ω	Impedance Ω/100kHz		Rated ripple current mA <sub>rms</sub>
					20°C	-10°C				20°C	-10°C	
5x11.5	E3	12	11.1	1.2	3.6	120	5.6	20.7	1.9	7.6	57	
5x15	E4	18	7.37	0.85	2.6	135	8.2	14.2	1.3	5.2	74	
6.3x11.5	F3	27	4.92	0.55	1.7	148	12	9.68	1.1	4.4	78	
6.3x15	F4	39	3.40	0.38	1.1	153	18	6.45	0.62	2.5	85	
8x12	G3	47	2.82	0.32	0.96	360	22	5.28	0.53	2.1	275	
8x15	G4	68	1.95	0.24	0.72	469	33	3.52	0.35	1.4	360	
8x20	G5	82	1.62	0.17	0.51	682	39	2.98	0.27	1.1	490	
10x12.5	H3	56	2.37	0.23	0.69	448	27	4.30	0.47	1.9	319	
10x16	H4	68	1.95	0.17	0.51	553	33	3.52	0.32	1.3	424	
10x20	H5	120	1.11	0.12	0.36	676	56	2.07	0.25	0.1	499	
10x25	H6	150	0.885	0.10	0.30	876	68	1.71	0.18	0.72	634	
10x30	H7	180	0.738	0.085	0.26	1020	100	1.16	0.15	0.60	739	
12.5x15	I4	• 150	0.885	0.11	0.33	745	• 68	1.71	0.20	0.80	613	
12.5x20	I5	220	0.604	0.075	0.23	979	100	1.16	0.13	0.52	805	
12.5x25	I6	270	0.492	0.065	0.20	1180	120	0.968	0.11	0.44	857	
12.5x30	I7	390	0.341	0.055	0.17	1310	180	0.646	0.090	0.36	1120	
12.5x35	I8	470	0.283	0.048	0.14	1470	220	0.528	0.075	0.30	1240	
12.5x40	I9	560	0.237	0.042	0.13	1590	270	0.431	0.060	0.24	1330	
16x16	J4	• 220	0.604	0.080	0.24	982	• 120	0.968	0.130	0.52	706	
16x20	J5	• 390	0.341	0.057	0.17	1210	• 180	0.646	0.11	0.44	916	
16x25	J6	470	0.283	0.052	0.16	1490	220	0.528	0.081	0.32	1290	
16x31.5	J7	680	0.196	0.042	0.13	1890	330	0.352	0.059	0.23	1630	
16x35.5	J8	820	0.162	0.036	0.11	2140	390	0.298	0.052	0.21	1750	
16x40	J9	1000	0.133	0.032	0.096	2410	470	0.248	0.045	0.18	1920	
18x16	K4	• 330	0.403	0.065	0.20	1200	• 150	0.775	0.12	0.48	871	
18x20	K5	• 560	0.237	0.058	0.17	1460	• 270	0.431	0.085	0.34	1170	
18x25	K6	• 680	0.196	0.050	0.15	1740	• 330	0.352	0.071	0.28	1500	
18x31.5	K7	820	0.162	0.042	0.13	1990	390	0.298	0.058	0.23	1630	
18x35.5	K8	1000	0.133	0.035	0.11	2340	560	0.208	0.054	0.22	1920	
18x40	K9	1200	0.111	0.032	0.096	2560	680	0.171	0.041	0.16	2100	

(Note) ESR : 20°C, 120Hz ; Rated ripple current : 105°C, 100kHz

• : The black circles in the capacitance column denote semi-standard products.

105°C Use, Miniature, High-Reliability, Low Impedance Capacitors

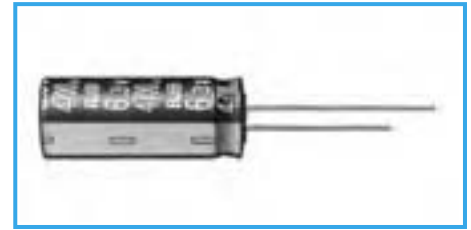
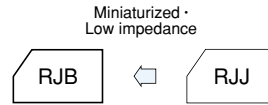
GREEN CAP

Low Impedance

105°C 5000hours

Anti-cleaning solvent

- Smaller and higher ripple current than RJJ Series.
- Guarantees 5000 hours at 105°C.  
(ø 5 to 6.3: 2000 hours ; ø 8 to 10: 3000 hours)



Marking color : White print on a black sleeve

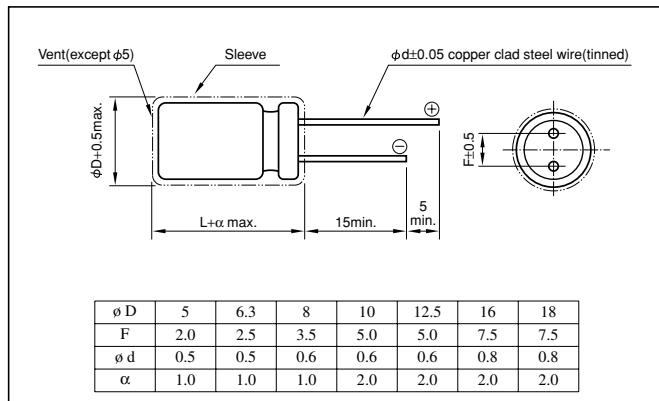
Specifications

Item	Performance																		
Category temperature range (°C)	-55 to +105																		
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)																		
Leakage current (µA)	Less than 0.01CV + 2 (after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)																		
Tangent of loss angle (tanδ)	<table border="1"> <tr> <td>Rated voltage (V)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <td>tanδ (max.)</td> <td>0.22</td> <td>0.19</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.10</td> <td>0.08</td> <td>0.07</td> </tr> </table>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	tanδ (max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.08	0.07
	Rated voltage (V)	6.3	10	16	25	35	50	63	100										
tanδ (max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.08	0.07											
0.02 is added to every 1000µF increase over 1000µF. (20°C, 120Hz)																			
Characteristics at high and low temperature	<table border="1"> <tr> <td>Rated voltage (V)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <td>Impedance ratio (max.)</td> <td>Z-55°C / Z+20°C</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </table>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	Impedance ratio (max.)	Z-55°C / Z+20°C	3	3	3	3	3	3	3
	Rated voltage (V)	6.3	10	16	25	35	50	63	100										
Impedance ratio (max.)	Z-55°C / Z+20°C	3	3	3	3	3	3	3											
(120Hz)																			
Endurance (105°C) (Applied ripple current)	Test time	5000 hours (ø 5 to 6.3: 2000 hours) (ø 8 to 10 : 3000 hours)																	
	Leakage current	The initial specified value or less																	
	Percentage of capacitance change	Within ±20% of initial value																	
	Tangent of the loss angle	200% or less of the initial specified value																	
Shelf life (105°C)	Test time	1000 hours																	
	Leakage current	The initial specified value or less																	
	Percentage of capacitance change	Within ±15% of initial value																	
	Tangent of the loss angle	150% or less of the initial specified value																	
Voltage application treatment																			
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)																		

Miniature Aluminum Electrolytic Capacitors

Outline Drawing

Unit: mm



- The electric characteristics are described on page 118.

Coefficient of Frequency for Rated Ripple Current

Rated capacitance(µF)	Frequency(Hz)	120	1k	10k	100k
0.47 to 180		0.40	0.75	0.90	1
220 to 390		0.50	0.85	0.95	1
470 to 1800		0.60	0.88	0.96	1
2200 to 3900		0.75	0.90	0.98	1
4700 to 10000		0.85	0.95	1	1

Part numbering system (example: 10V1000µF)

RJB	—	10	V	102	M	H4	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

- The standard ratings are described on the next page.

## Standard Ratings

Rated voltage (V)	Item	6.3					10					16				
		Case	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)
				20°C	-10°C				20°C	-10°C				20°C	-10°C	
100	—	—	—	—	—	5x11.5	E3	0.65	1.3	181	—	—	—	—	—	
220	—	—	—	—	—	6.3x11.5	F3	0.32	0.64	290	—	—	—	—	—	
330	6.3x11.5	F3	0.32	0.64	290	8x12	G3	0.17	0.34	555	8x12	G3	0.17	0.34	555	
470	8x12	G3	0.17	0.34	555	8x12	G3	0.17	0.34	555	10x12.5	H3	0.12	0.24	760	
680	8x12	G3	0.17	0.34	555	10x12.5	H3	0.12	0.24	760	10x16	H4	0.080	0.16	1050	
1000	10x12.5	H3	0.12	0.24	760	10x16	H4	0.080	0.16	1050	10x20	H5	0.062	0.124	1220	
2200	10x25	H6	0.052	0.104	1440	12.5x20	I 5	0.042	0.084	1690	12.5x25	I 6	0.034	0.068	1950	
3300	12.5x20	I 5	0.042	0.084	1690	12.5x25	I 6	0.034	0.068	1950	16x25	J 6	0.028	0.056	2560	
4700	12.5x30	I 7	0.030	0.060	2310	16x25	J 6	0.028	0.056	2560	16x31.5	J 7	0.025	0.050	3010	
6800	16x25	J 6	0.028	0.056	2560	16x31.5	J 7	0.025	0.050	3010	—	—	—	—	—	
10000	16x31.5	J 7	0.025	0.050	3010	—	—	—	—	—	—	—	—	—	—	

Rated voltage (V)	Item	25					35					50				
		Case	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)
				20°C	-10°C				20°C	-10°C				20°C	-10°C	
22	—	—	—	—	—	—	—	—	—	—	5x11.5	E3	0.95	1.9	170	
33	—	—	—	—	—	5x11.5	E3	0.65	1.3	181	6.3x11.5	F3	0.46	0.92	260	
47	5x11.5	E3	0.65	1.3	181	6.3x11.5	F3	0.32	0.64	290	6.3x11.5	F3	0.46	0.92	260	
100	6.3x11.5	F3	0.32	0.64	290	8x12	G3	0.17	0.34	555	8x12	G3	0.21	0.42	485	
150	—	—	—	—	—	—	—	—	—	—	10x12.5	H3	0.19	0.38	615	
220	8x12	G3	0.17	0.34	555	10x12.5	H3	0.12	0.24	760	10x16	H4	0.16	0.32	850	
330	10x12.5	H3	0.12	0.24	760	10x16	H4	0.080	0.16	1050	10x20	H5	0.085	0.17	1050	
470	10x16	H4	0.080	0.16	1050	10x20	H5	0.062	0.124	1220	12.5x20	I 5	0.060	0.12	1500	
680	10x20	H5	0.062	0.124	1220	12.5x20	I 5	0.042	0.084	1690	12.5x25	I 6	0.045	0.090	1832	
1000	12.5x20	I 5	0.042	0.084	1690	12.5x25	I 6	0.034	0.068	1950	16x25	J 6	0.038	0.076	2240	
2200	16x25	J 6	0.028	0.056	2560	16x31.5	J 7	0.025	0.050	3010	—	—	—	—	—	
3300	16x31.5	J 7	0.025	0.050	3010	—	—	—	—	—	—	—	—	—	—	

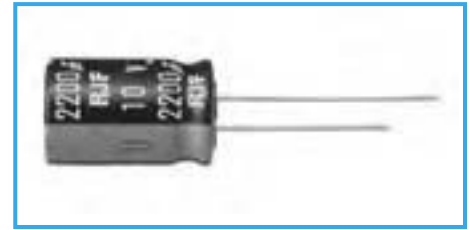
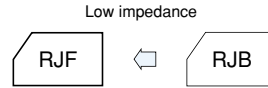
Rated voltage (V)	Item	63					100				
		Case	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)
				20°C	-10°C				20°C	-10°C	
3.3	—	—	—	—	—	5x11.5	E3	1.9	7.6	57	
4.7	5x11.5	E3	1.2	3.6	120	5x11.5	E3	1.9	7.6	57	
10	5x11.5	E3	1.2	3.6	120	6.3x11.5	F3	1.1	4.4	78	
22	6.3x11.5	F3	0.55	1.7	148	8x12	G3	0.53	2.1	275	
33	6.3x11.5	F3	0.55	1.7	148	10x12.5	H3	0.47	1.9	319	
47	8x12	G3	0.32	0.96	360	10x16	H4	0.32	1.3	424	
100	10x12.5	H3	0.23	0.69	448	12.5x20	I 5	0.13	0.52	805	
220	10x20	H5	0.12	0.36	676	16x25	J 6	0.081	0.32	1290	
330	12.5x20	I 5	0.075	0.23	979	16x25	J 6	0.081	0.32	1290	
470	12.5x25	I 6	0.065	0.20	1180	16x31.5	J 7	0.059	0.23	1630	
1000	16x31.5	J 7	0.042	0.13	1890	—	—	—	—	—	

(Note) Impedance : 100kHz ; Rated ripple current : 105°C, 100kHz

105°C Use, Miniature, High-Reliability, Extra Low Impedance Capacitors

GREEN CAP Low Impedance 105°C 5000hours Anti-cleaning solvent

- Higher ripple current than RJB Series.
- Guarantees 5000 hours at 105°C.  
(5L, 7L: 1000 hours ; ϕ 5 to 6.3: 2000 hours ; ϕ 8 to 10: 3000 hours)



Marking color : White print on a black sleeve

Specifications

Item	Performance																				
Category temperature range (°C)	-40 to +105																				
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)																				
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)																				
Tangent of loss angle (tanδ)	<table border="1"> <tr> <th>Rated voltage (V)</th> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <th>tanδ (max.)</th> <td>0.22</td> <td>0.19</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.10</td> </tr> </table>	Rated voltage (V)	6.3	10	16	25	35	50	tanδ (max.)	0.22	0.19	0.16	0.14	0.12	0.10						
	Rated voltage (V)	6.3	10	16	25	35	50														
tanδ (max.)	0.22	0.19	0.16	0.14	0.12	0.10															
0.02 is added to every 1000µF increase over 1000µF. (20°C,120Hz)																					
Characteristics at high and low temperature	<table border="1"> <tr> <th>Rated voltage (V)</th> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <th rowspan="2">Impedance ratio (max.)</th> <td>Z-25°C / Z+20°C</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </table>	Rated voltage (V)	6.3	10	16	25	35	50	Impedance ratio (max.)	Z-25°C / Z+20°C	2	2	2	2	2	Z-40°C / Z+20°C	3	3	3	3	3
	Rated voltage (V)	6.3	10	16	25	35	50														
Impedance ratio (max.)	Z-25°C / Z+20°C	2	2	2	2	2															
	Z-40°C / Z+20°C	3	3	3	3	3															
(120Hz)																					
Endurance (105°C) (Applied ripple current)	Test time	5L & 7L : 1000 hours ϕ 5 & ϕ 6.3 : 2000 hours ϕ 8 & ϕ 10 : 3000 hours ϕ 12.5 & ϕ 16 : 5000 hours																			
	Leakage current	The initial specified value or less																			
	Percentage of capacitance change	Within ±25% of initial value																			
	Tangent of the loss angle	200% or less of the initial specified value																			
Shelf life (105°C)	Test time	1000 hours																			
	Leakage current	The initial specified value or less																			
	Percentage of capacitance change	Within ±25% of initial value																			
	Tangent of the loss angle	200% or less of the initial specified value																			
Voltage application treatment																					
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)																				

Aluminum Electrolytic Capacitors Miniature

Outline Drawing

Unit: mm

ϕ D	4	5	6.3	8	10	12.5	16
F	1.5	2.0	2.5	3.5	5.0	5.0	7.5
ϕ d	0.45	0.5	0.5	0.6	0.6	0.6	0.8
α	1.0	1.0	1.0	1.0	2.0	2.0	2.0

Coefficient of Frequency for Rated Ripple Current

Rated capacitance(µF)	Frequency(Hz)			
	120	1k	10k	100k
5.6 to 180	0.40	0.75	0.90	1
220 to 390	0.50	0.85	0.94	1
470 to 1800	0.60	0.87	0.95	1
2200 to 3900	0.75	0.90	0.95	1
4700 to 6800	0.85	0.95	0.98	1

Part numbering system (example: 10V1000µF)

RJF	—	10	V	102	M	H4	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

• The electric characteristics are described on page 118.

• The standard ratings are described on the next page.

### Standard Ratings

Rated voltage (V)	Item	6.3					10					16				
		Case øD x L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case øD x L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case øD x L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)
				20°C	-10°C				20°C	-10°C				20°C	-10°C	
18	—	—	—	—	—	—	—	—	—	—	4x7	D1	0.92	2.8	130	
27	—	—	—	—	—	4x7	D1	0.89	2.7	130	6.3x5	F0	0.30	0.95	210	
33	—	—	—	—	—	—	—	—	—	—	5x7	E1	0.45	1.4	210	
39	4x7	D1	0.85	2.6	130	—	—	—	—	—	6.3x5	F0	0.30	0.95	210	
47	—	—	—	—	—	6.3x5	F0	0.29	0.93	210	—	—	—	—	—	
56	—	—	—	—	—	5x7	E1	0.44	1.4	210	5x11.5	E3	0.22	0.80	345	
68	5x7	E1	0.43	1.3	210	—	—	—	—	—	6.3x7	F1	0.24	0.72	300	
100	6.3x5	F0	0.28	0.91	210	5x11.5	E3	0.22	0.8	345	—	—	—	—	—	
120	—	—	—	—	—	6.3x7	F1	0.23	0.69	300	8x7	G1	0.15	0.45	380	
150	5x11.5	E3	0.22	0.80	345	—	—	—	—	—	6.3x11.5	F2	0.094	0.35	540	
180	6.3x7	F1	0.23	0.69	300	—	—	—	—	—	—	—	—	—	—	
220	—	—	—	—	—	8x7	G1	0.15	0.45	380	—	—	—	—	—	
330	6.3x11.5	F3	0.094	0.35	540	6.3x11.5	F3	0.094	0.35	540	—	—	—	—	—	
470	—	—	—	—	—	8x12	G3	0.056	0.19	945	8x12	G3	0.056	0.19	945	
560	8x12	G3	0.056	0.19	945	—	—	—	—	—	8x15	G4	0.045	0.15	1250	
680	—	—	—	—	—	10x12.5	H3	0.039	0.14	1330	10x16	H4	0.028	0.10	1760	
820	8x15	G4	0.046	0.15	1250	—	—	—	—	—	—	—	—	—	—	
1000	10x12.5	H3	0.039	0.14	1330	10x16	H4	0.028	0.10	1760	10x20	H5	0.020	0.060	1960	
1200	10x16	H4	0.028	0.10	1760	10x20	H5	0.020	0.060	1960	10x25	H6	0.018	0.054	2250	
1500	10x20	H5	0.020	0.060	1960	10x25	H6	0.018	0.054	2250	12.5x20	I 5	0.017	0.043	2480	
2200	10x25	H6	0.018	0.054	2250	12.5x20	I 5	0.017	0.043	2480	12.5x25	I 6	0.015	0.038	2900	
2700	—	—	—	—	—	—	—	—	—	—	16x20	J 5	0.015	0.038	3250	
3300	12.5x20	I 5	0.017	0.043	2480	12.5x25	I 6	0.015	0.038	2900	16x25	J 6	0.013	0.035	3630	
3900	12.5x25	I 6	0.015	0.038	2900	16x20	J 5	0.015	0.038	3250	16x25	J 6	0.013	0.035	3630	
4700	12.5x30	I 7	0.013	0.033	3450	16x25	J 6	0.013	0.035	3630	—	—	—	—	—	
5600	16x20	J 5	0.015	0.038	3570	16x25	J 6	0.013	0.035	3630	—	—	—	—	—	
6800	16x25	J 6	0.013	0.035	3630	—	—	—	—	—	—	—	—	—	—	

Rated voltage (V)	Item	25					35					50				
		Case øD x L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case øD x L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case øD x L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)
				20°C	-10°C				20°C	-10°C				20°C	-10°C	
5.6	—	—	—	—	—	—	—	—	—	—	4x7	D1	1.0	3.0	130	
10	5x5	E0	0.61	1.5	130	5x5	E0	0.63	1.5	130	5x7	E1	0.50	1.5	210	
15	4x7	D1	0.94	2.9	130	4x7	D1	0.96	2.9	130	—	—	—	—	—	
18	—	—	—	—	—	5x7	E1	0.47	1.5	210	—	—	—	—	—	
22	6.3x5	F0	0.31	0.97	210	6.3x5	F0	0.32	1.0	210	6.3x7	F1	0.26	0.78	300	
27	5x7	E1	0.46	1.4	210	—	—	—	—	—	5x11.5	E3	0.34	1.18	238	
33	—	—	—	—	—	5x11.5	E3	0.22	0.80	345	8x7	G1	0.17	0.51	380	
39	—	—	—	—	—	6.3x7	F1	0.25	0.75	300	—	—	—	—	—	
47	5x11.5	E3	0.22	0.80	345	—	—	—	—	—	—	—	—	—	—	
56	6.3x7	F1	0.24	0.72	300	8x7	G1	0.16	0.48	380	6.3x11.5	F3	0.14	0.50	385	
100	8x7	G1	0.15	0.45	380	6.3x11.5	F3	0.094	0.35	540	—	—	—	—	—	
120	6.3x11.5	F3	0.13	0.41	405	—	—	—	—	—	8x12	G3	0.074	0.22	724	
150	—	—	—	—	—	—	—	—	—	—	8x15	G4	0.061	0.18	950	
180	—	—	—	—	—	8x12	G3	0.056	0.19	945	10x12.5	H3	0.061	0.18	979	
220	8x12	G3	0.056	0.19	945	10x12.5	H3	0.039	0.14	1330	10x16	H4	0.042	0.12	1370	
270	—	—	—	—	—	8x20	G5	0.029	0.11	1500	10x20	H5	0.030	0.090	1580	
330	10x12.5	H3	0.039	0.14	1330	10x16	H4	0.028	0.10	1760	10x25	H6	0.028	0.085	1870	
470	10x16	H4	0.028	0.10	1760	10x20	H5	0.020	0.060	1960	12.5x20	I 5	0.027	0.068	2050	
560	—	—	—	—	—	10x25	H6	0.018	0.054	2250	12.5x25	I 6	0.023	0.059	2410	
680	10x20	H5	0.020	0.060	1960	12.5x20	I 5	0.017	0.043	2480	16x20	J 5	0.023	0.059	2730	
820	10x25	H6	0.018	0.054	2250	—	—	—	—	—	16x20	J 5	0.023	0.059	2730	
1000	12.5x20	I 5	0.017	0.043	2480	12.5x25	I 6	0.015	0.038	2900	16x25	J 6	0.021	0.056	3010	
1200	—	—	—	—	—	16x20	J 5	0.015	0.038	3250	—	—	—	—	—	
1500	12.5x25	I 6	0.015	0.038	2900	16x25	J 6	0.013	0.035	3630	—	—	—	—	—	
1800	16x20	J 5	0.015	0.038	3250	16x25	J 6	0.013	0.035	3630	—	—	—	—	—	
2200	16x25	J 6	0.013	0.035	3630	—	—	—	—	—	—	—	—	—	—	
2700	16x25	J 6	0.013	0.035	3630	—	—	—	—	—	—	—	—	—	—	

(Note) Impedance : 100kHz Rated ripple current : 105°C, 100kHz

105°C Use, Miniature, Long Life, extra Low Impedance Capacitors

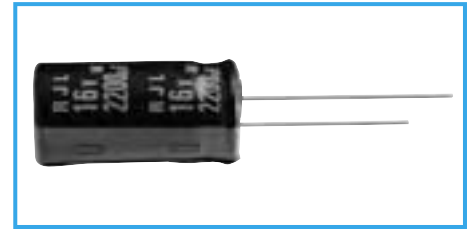
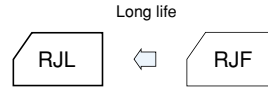
GREEN CAP

Low Impedance

105°C 10000hours

Anti-cleaning solvent

- Long life than RJF Series.
- Guarantees 4000 to 10000 hours at 105°C.



Marking color : White print on a black sleeve

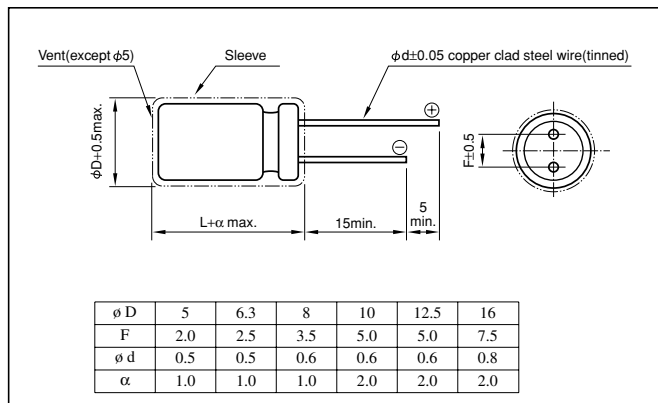
Specifications

Item	Performance																										
Category temperature range (°C)	-40 to +105																										
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)																										
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF),V: Rated voltage(V) (20°C)																										
Tangent of loss angle (tanδ)	<table border="1"> <tr> <td>Rated voltage (V)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <td>tanδ (max.)</td> <td>0.22</td> <td>0.19</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.10</td> <td>0.09</td> <td>0.08</td> </tr> </table>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	tanδ (max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08								
	Rated voltage (V)	6.3	10	16	25	35	50	63	100																		
tanδ (max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08																			
0.02 is added to every 1000µF increase over 1000µF. (20°C,120Hz)																											
Characteristics at high and low temperature	<table border="1"> <tr> <td>Rated voltage (V)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <td rowspan="2">Impedance ratio (max.)</td> <td>Z-25°C / Z+20°C</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </table>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2	2	2	Z-40°C / Z+20°C	8	6	4	3	3	3	3
	Rated voltage (V)	6.3	10	16	25	35	50	63	100																		
Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2	2	2																			
	Z-40°C / Z+20°C	8	6	4	3	3	3	3																			
(120Hz)																											
Endurance (105°C) (Applied ripple current)	Test time	φ 5, φ 6.3: 5000 hours (6.3~10WV:4000 hours) φ 8, φ 10: 7000 hours (6.3~10WV:6000 hours) φ 12.5, φ 16: 10000 hours (6.3~10WV:8000 hours)																									
	Leakage current	The initial specified value or less																									
	Percentage of capacitance change	Within ±25% of initial value																									
	Tangent of the loss angle	200% or less of the initial specified value																									
Shelf life (105°C)	Test time	1000 hours																									
	Leakage current	The initial specified value or less																									
	Percentage of capacitance change	Within ±25% of initial value																									
	Tangent of the loss angle	200% or less of initial specified value																									
Voltage application treatment																											
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)																										

Miniature Aluminum Electrolytic Capacitors

Outline Drawing

Unit: mm



Coefficient of Frequency for Rated Ripple Current

Rated capacitance(µF)	Frequency(Hz)	120	1k	10k	100k
to 33	47 to 270	0.42	0.70	0.90	1.00
	330 to 680	0.50	0.73	0.92	1.00
	820 to 1800	0.55	0.77	0.94	1.00
	2200 to 6800	0.60	0.80	0.96	1.00
		0.70	0.85	0.98	1.00

Part numbering system (example: 10V100µF)

RJL	—	10 V	102	M	H4	#
Series code		Rated voltage symbol	Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol

• The standard ratings are described on the next page.

## Standard Ratings

Rated voltage (V)	Item	6.3					10					16				
		Case øD x L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case øD x L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case øD x L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)
				20°C	-10°C				20°C	-10°C				20°C	-10°C	
56	—	—	—	—	—	—	—	—	—	—	5x11.5	E3	0.58	2.3	210	
100	—	—	—	—	—	5x11.5	E3	0.58	2.3	210	—	—	—	—	—	
120	—	—	—	—	—	—	—	—	—	—	6.3x11.5	F3	0.22	0.87	340	
150	5x11.5	E3	0.58	2.3	210	—	—	—	—	—	—	—	—	—	—	
220	—	—	—	—	—	6.3x11.5	F3	0.22	0.87	340	—	—	—	—	—	
330	6.3x11.5	F3	0.22	0.87	340	—	—	—	—	—	8x12	G3	0.13	0.52	640	
470	—	—	—	—	—	8x12	G3	0.13	0.52	640	8x15	G4	0.087	0.35	840	
560	8x12	G3	0.13	0.52	640	8x15	G4	0.087	0.35	840	—	—	—	—	—	
680	8x12	G3	0.13	0.52	640	10x12.5	H3	0.080	0.32	865	10x16	H4	0.060	0.24	1210	
820	10x12.5	H3	0.080	0.32	865	10x16	H4	0.060	0.24	1210	10x20	H5	0.046	0.18	1400	
1000	8x15	G4	0.087	0.35	840	10x16	H4	0.060	0.24	1210	10x20	H5	0.046	0.18	1400	
1200	10x16	H4	0.060	0.24	1210	10x20	H5	0.046	0.18	1400	10x25	H6	0.042	0.17	1650	
1500	10x20	H5	0.046	0.18	1400	10x25	H6	0.042	0.17	1650	12.5x20	I5	0.035	0.12	1900	
1800	10x25	H6	0.042	0.17	1650	12.5x20	I5	0.035	0.12	1900	12.5x25	I6	0.027	0.089	2230	
2200	10x25	H6	0.042	0.17	1650	12.5x20	I5	0.035	0.12	1900	12.5x25	I6	0.027	0.089	2230	
2700	—	—	—	—	—	—	—	—	—	—	16x20	J5	0.027	0.078	2530	
3300	12.5x20	I5	0.035	0.12	1900	12.5x25	I6	0.027	0.089	2230	12.5x35	I8	0.020	0.065	2880	
3900	—	—	—	—	—	—	—	—	—	—	16x25	J6	0.021	0.060	2930	
4700	12.5x30	I7	0.024	0.078	2650	12.5x35	I8	0.020	0.065	2880	—	—	—	—	—	
5600	16x20	J5	0.027	0.078	2530	16x25	J6	0.021	0.060	2930	—	—	—	—	—	
6800	16x25	J6	0.021	0.060	2930	—	—	—	—	—	—	—	—	—	—	

Rated voltage (V)	Item	25					35					50				
		Case øD x L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case øD x L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case øD x L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)
				20°C	-10°C				20°C	-10°C				20°C	-10°C	
10	—	—	—	—	—	—	—	—	—	—	5x11.5	E3	1.50	6.0	100	
22	—	—	—	—	—	—	—	—	—	—	5x11.5	E3	0.70	2.8	180	
33	—	—	—	—	—	5x11.5	E3	0.58	2.3	210	—	—	—	—	—	
47	5x11.5	E3	0.58	2.3	210	—	—	—	—	—	—	—	—	—	—	
56	—	—	—	—	—	6.3x11.5	F3	0.22	0.87	340	6.3x11.5	F3	0.30	1.2	295	
100	6.3x11.5	F3	0.22	0.87	340	—	—	—	—	—	8x12	G3	0.17	0.68	555	
120	—	—	—	—	—	—	—	—	—	—	8x15	G4	0.12	0.48	730	
150	—	—	—	—	—	8x12	G3	0.13	0.52	640	10x12.5	H3	0.12	0.48	760	
180	—	—	—	—	—	8x15	G4	0.087	0.35	870	8x20	G5	0.091	0.36	910	
220	8x12	G3	0.13	0.52	640	8x15	G4	0.087	0.35	870	10x16	H4	0.084	0.34	1050	
270	—	—	—	—	—	8x20	G5	0.069	0.27	1050	10x20	H5	0.060	0.24	1220	
330	8x15	G4	0.087	0.35	840	10x16	H4	0.060	0.24	1210	10x25	H6	0.055	0.22	1440	
470	10x16	H4	0.060	0.24	1210	10x20	H5	0.046	0.18	1400	12.5x20	I5	0.045	0.15	1660	
560	—	—	—	—	—	10x25	H6	0.042	0.17	1650	12.5x25	I6	0.034	0.11	1950	
680	10x20	H5	0.046	0.18	1400	12.5x20	I5	0.035	0.12	1900	12.5x25	I6	0.028	0.085	1870	
820	10x25	H6	0.042	0.17	1650	12.5x25	I6	0.027	0.089	2230	12.5x30	I7	0.030	0.10	2310	
1000	12.5x20	I5	0.035	0.12	1900	12.5x25	I6	0.027	0.089	2230	16x25	J6	0.025	0.075	2555	
1200	12.5x25	I6	0.027	0.089	2230	16x20	J5	0.027	0.078	2530	—	—	—	—	—	
1500	12.5x25	I6	0.027	0.089	2230	12.5x35	I8	0.020	0.065	2880	—	—	—	—	—	
1800	16x20	J5	0.027	0.078	2530	16x25	J6	0.021	0.060	2930	—	—	—	—	—	
2200	12.5x35	I8	0.020	0.065	2880	—	—	—	—	—	—	—	—	—	—	
2700	16x25	J6	0.021	0.060	2930	—	—	—	—	—	—	—	—	—	—	

Rated voltage (V)	Item	63					100				
		Case øD x L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case øD x L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)
				20°C	-10°C				20°C	-10°C	
6.8	—	—	—	—	—	5x11.5	E3	2.3	9.3	55	
15	5x11.5	E3	2.3	9.3	55	6.3x11.5	F3	1.2	5.0	115	
27	6.3x11.5	F3	1.2	5.0	115	8x12	G3	0.63	2.8	232	
47	—	—	—	—	—	10x12.5	H3	0.43	1.8	288	
56	8x12	G3	0.63	2.8	232	8x20	G5	0.33	1.6	362	
68	—	—	—	—	—	10x16	H4	0.31	1.5	357	
82	8x15	G4	0.45	2.1	300	10x20	H5	0.21	0.94	466	
100	—	—	—	—	—	10x25	H6	0.20	0.84	531	
120	10x16	H4	0.31	1.5	357	12.5x20	I5	0.16	0.64	690	
180	10x20	H5	0.21	0.94	466	12.5x25	I6	0.120	0.45	784	
220	10x25	H6	0.20	0.84	531	16x20	J5	0.091	0.38	1040	
270	12.5x20	I5	0.16	0.64	690	16x25	J6	0.073	0.27	1250	
330	12.5x25	I6	0.12	0.45	784	—	—	—	—	—	
390	16x20	J5	0.091	0.38	1040	—	—	—	—	—	
470	16x20	J5	0.091	0.38	1040	—	—	—	—	—	
560	16x25	J6	0.073	0.27	1250	—	—	—	—	—	

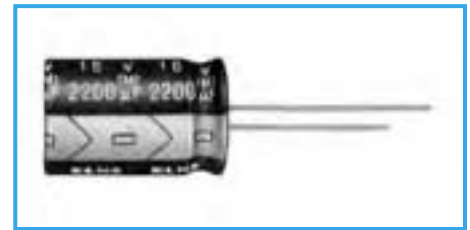
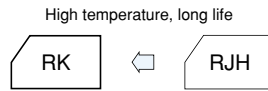
(Note) Impedance : 100kHz ; Rated ripple current : 105°C, 100kHz



125°C Use, Long Life Capacitors

- GREEN CAP
- Low Impedance
- 125°C 5000hours
- Anti-cleaning solvent

- Guarantees 5000 hours at 125°C. (ø 8: 2000 hours, ø 10: 3000 hours).
- Best-suited to smoothing circuits and control circuits for industrial equipment power supplies of which long life and high reliability are required.



Marking color : White print on a black sleeve

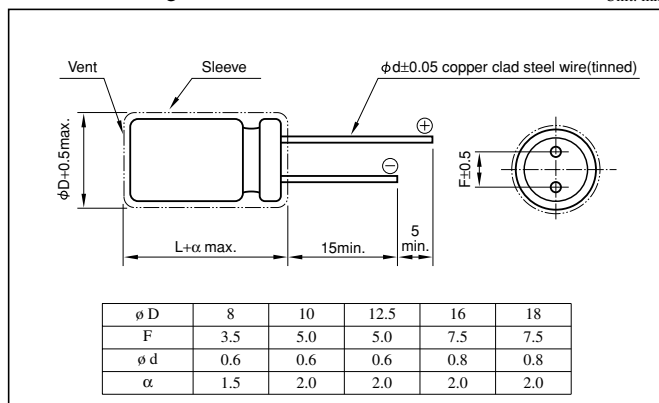
Specifications

Item	Performance														
Category temperature range (°C)	-40 to +125														
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)														
Leakage current (µA)	Less than 0.04CV (after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)														
Tangent of loss angle (tanδ)	<table border="1" style="width: 100%;"> <tr> <th>Rated voltage (V)</th> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> </tr> <tr> <th>tanδ (max.)</th> <td>0.20</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.10</td> <td>0.09</td> </tr> </table>	Rated voltage (V)	10	16	25	35	50	63	tanδ (max.)	0.20	0.16	0.14	0.12	0.10	0.09
	Rated voltage (V)	10	16	25	35	50	63								
tanδ (max.)	0.20	0.16	0.14	0.12	0.10	0.09									
0.02 is added to every 1000µF increase over 1000µF. (20°C,120Hz)															
Characteristics at high and low temperature	<table border="1" style="width: 100%;"> <tr> <th>Impedance ratio (max.)</th> <td>Z-40°C / Z+20°C</td> <td>3 or less</td> </tr> </table> <p style="text-align: right;">(120Hz)</p>	Impedance ratio (max.)	Z-40°C / Z+20°C	3 or less											
Impedance ratio (max.)	Z-40°C / Z+20°C	3 or less													
Endurance (125°C) (Applied ripple current)	Test time	5000 hours (ø 10: 3000 hours, ø 8: 2000 hours)													
	Leakage current	The initial specified value or less													
	Percentage of capacitance change	Within ±30% of initial value													
	Tangent of the loss angle	300% or less of the initial specified value													
Shelf life (125°C)	Test time	1000 hours													
	Leakage current	The initial specified value or less													
	Percentage of capacitance change	Within ±30% of initial value													
	Tangent of the loss angle	300% or less of the initial specified value													
Voltage application treatment															
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)														

Miniature Aluminum Electrolytic Capacitors

Outline Drawing

Unit: mm



- The electric characteristics are described on page 119.

Coefficient of Frequency for Rated Ripple Current

Rated capacitance(µF)	Frequency(Hz)			
	120	1k	10k	100k
47 to 100	0.40	0.75	0.90	1
220 to 330	0.50	0.85	0.95	1
470 to 1000	0.60	0.88	0.96	1
2200 to 10000	0.75	0.90	0.98	1

Part numbering system (example: 10V100µF)

RK	—	10	V	102	M	H5	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

- The standard ratings are described on the next page.

## Standard Ratings

Rated voltage (V) Item Rated capacitance (μF)	10				16				25			
	Case øD x L (mm)	Casing symbol	Impedance (Ω)	Rated ripple current (mA <sub>rms</sub> )	Case øD x L (mm)	Casing symbol	Impedance (Ω)	Rated ripple current (mA <sub>rms</sub> )	Case øD x L (mm)	Casing symbol	Impedance (Ω)	Rated ripple current (mA <sub>rms</sub> )
220	—	—	—	—	8x12	G3	0.26	340	8x15	G4	0.19	480
330	8x12	G3	0.26	340	10x12.5	H3	0.20	500	10x16	H4	0.15	630
470	10x12.5	H3	0.20	500	10x16	H4	0.15	630	10x20	H5	0.10	770
1000	10x20	H5	0.10	770	12.5x20	I 5	0.070	920	12.5x25	I 6	0.050	1250
2200	12.5x25	I 6	0.050	1250	16x25	J 6	0.042	1380	16x25	J 6	0.042	1380
3300	16x25	J 6	0.042	1380	18x25	K6	0.041	1450	18x31.5	K7	0.035	1720
4700	18x25	K6	0.041	1450	18x35.5	K8	0.029	1980	18x35.5	K8	0.029	1980
10000	18x35.5	K8	0.029	1980	—	—	—	—	—	—	—	—

Rated voltage (V) Item Rated capacitance (μF)	35				50				63			
	Case øD x L (mm)	Casing symbol	Impedance (Ω)	Rated ripple current (mA <sub>rms</sub> )	Case øD x L (mm)	Casing symbol	Impedance (Ω)	Rated ripple current (mA <sub>rms</sub> )	Case øD x L (mm)	Casing symbol	Impedance (Ω)	Rated ripple current (mA <sub>rms</sub> )
47	—	—	—	—	—	—	—	—	8x12	G3	0.68	245
100	8x12	G3	0.26	340	10x12.5	H3	0.36	415	10x16	H4	0.30	455
220	10x16	H4	0.15	630	10x20	H5	0.18	655	12.5x20	I 5	0.18	665
330	10x20	H5	0.10	770	12.5x20	I 5	0.12	780	12.5x25	I 6	0.14	995
470	12.5x20	I 5	0.070	920	12.5x25	I 6	0.090	1060	16x25	J 6	0.10	1000
1000	16x25	J 6	0.042	1380	16x25	J 6	0.078	1130	18x31.5	K7	0.084	1280
2200	18x31.5	K7	0.035	1720	18x35.5	K8	0.051	1720	—	—	—	—
3300	18x40	K9	0.025	2240	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 125°C, 100kHz; Impedance : 20°C, 100kHz

Low Leakage Current Capacitors

GREEN CAP

- Low leakage current (after 1 minute) : 0.006CV or 0.5(μA).



Marking color : White print on a blue sleeve

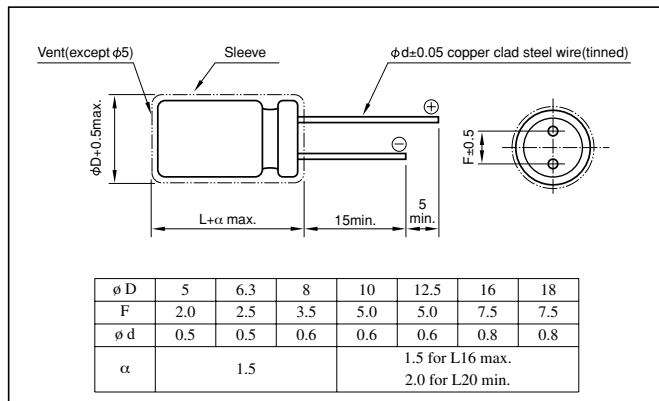
Specifications

Item	Performance	
Category temperature range (°C)	-40 to +85	
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)	
Leakage current (μA)	Less than 0.006CV or 0.5 whichever is larger (after 1 minute) Less than 0.002CV or 0.3 whichever is larger (after 2 minutes), C: Rated capacitance(μF); V: Rated voltage(V) (20°C)	
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3    10    16    25    35    50
	tanδ (max.)	More than 1μF: 0.20, 0.17, 0.13, 0.10, 0.10, 0.08 1μF or less: 0.06, 0.06, 0.06, 0.06, 0.06, 0.06 (20°C,120Hz)
Characteristics at high and low temperature	Rated voltage (V)	6.3    10    16    25    35    50
	Impedance ratio (max.)	Z-25°C / Z+20°C: 4, 3, 2, 2, 2, 2 Z-40°C / Z+20°C: 8, 6, 4, 4, 3, 3 (120Hz)
Endurance (105°C) (Applied ripple current)	Test time	1000 hours
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±20% of initial value
	Tangent of the loss angle	150% or less of the initial specified value
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment	
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)	

Aluminum Electrolytic Capacitors

Outline Drawing

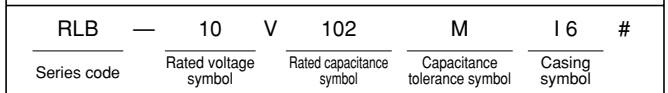
Unit: mm



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz) CV(μFxV)	50 · 60	120	1k	10k · 100k
		6.3 to 10	All CV value	0.8	1
16 to 25	≤ 1000	0.8	1	1.5	1.7
	1000 <	0.8	1	1.2	1.3
35 to 50	All CV value	0.8	1	1.6	1.9

Part numbering system (example: 10V100μF)



Casing symbol

Case φ DxL(mm)	Casing Symbol	Case φ DxL(mm)	Casing Symbol	Case φ DxL(mm)	Casing Symbol	Case φ DxL(mm)	Casing Symbol
5x11	E3	10x12.5	H3	12.5x20	I 5	16x31.5	J 7
6.3x11	F3	10x16	H4	12.5x25	I 6	16x35.5	J 8
8x11.5	G3	10x20	H5	16x25	J 6	18x35.5	K 8
						18x40	K 9

Standard Ratings

Rated capacitance(μF)	6.3		10		16		25		35		50	
	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms
0.47	—	—	—	—	—	—	—	—	—	—	5x11	14
1	—	—	—	—	—	—	—	—	—	—	5x11	20
2.2	—	—	—	—	—	—	—	—	—	—	5x11	26
3.3	—	—	—	—	—	—	—	—	—	—	5x11	32
4.7	—	—	—	—	—	—	5x11	34	5x11	34	6.3x11	43
10	—	—	—	—	5x11	543	6.3x11	57	6.3x11	57	8x11.5	75
22	—	—	5x11	56	6.3x11	74	8x11.5	99	8x11.5	99	10x12.5	131
33	—	—	6.3x11	79	6.3x11	90	8x11.5	121	10x12.5	144	10x16	176
47	—	—	6.3x11	94	8x11.5	127	10x12.5	172	10x12.5	172	10x16	210
100	—	—	8x11.5	160	10x12.5	220	10x16	270	10x20	300	12.5x20	380
220	10x12.5	260	10x16	350	10x20	390	12.5x20	510	12.5x25	550	16x25	720
330	10x16	350	10x20	460	12.5x20	550	12.5x25	680	16x25	790	16x31.5	970
470	10x20	460	12.5x20	570	12.5x25	650	16x25	940	16x25	940	16x35.5	1210
1000	12.5x25	840	12.5x25	910	16x25	1210	16x35.5	1580	18x35.5	1690	—	—
2200	16x25	1440	16x31.5	1710	18x35.5	2200	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz

NOTE

Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

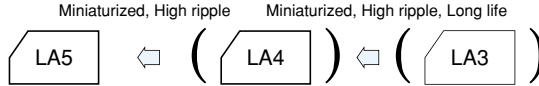
### PCB Snap-In Ultra-Miniaturized Capacitors

GREEN CAP

- 20mm-tall products for every diameter of  $\phi 22$  to  $\phi 35$  are now offered in series.
- As many as 4 case sizes available for the same rating.



Marking color : White print on a black sleeve



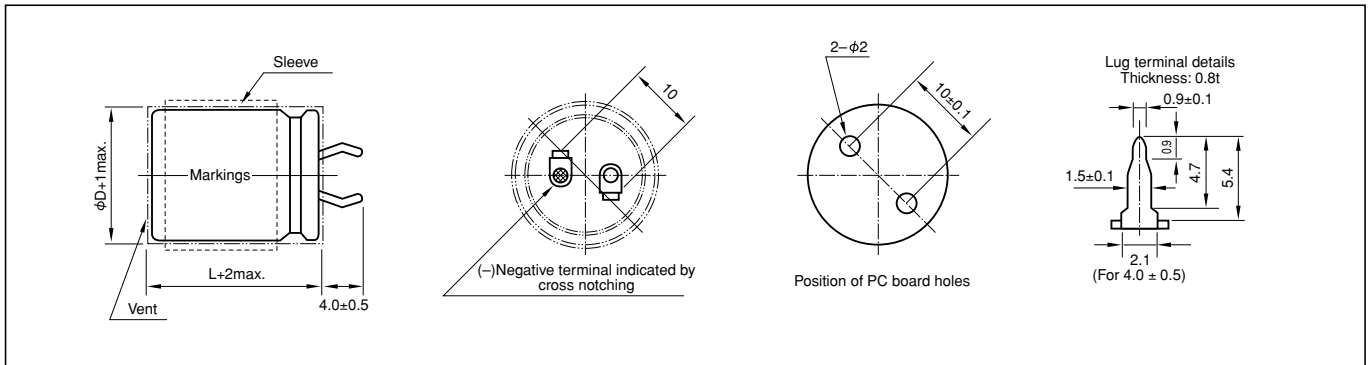
### Specifications

Item	Performance																																												
Category temperature range (°C)	-40 to +85(450V is at -25 to +85)																																												
Tolerance at rated capacitance (%)	$\pm 20$ (20°C, 120Hz)																																												
Leakage current ( $\mu A$ )	Less than 0.01CV or 1.5mA whichever is smaller(after 5 minutes) C: Rated capacitance( $\mu F$ ); V: Rated voltage(V) (20°C)																																												
Tangent of loss angle	<table border="1"> <tr> <th>Rated voltage (V)</th> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63 to 100</td> </tr> <tr> <th><math>\tan\delta</math> (max.)</th> <td>0.80</td> <td>0.60</td> <td>0.50</td> <td>0.40</td> <td>0.30</td> <td>0.20</td> </tr> </table>	Rated voltage (V)	10	16	25	35	50	63 to 100	$\tan\delta$ (max.)	0.80	0.60	0.50	0.40	0.30	0.20																														
	Rated voltage (V)	10	16	25	35	50	63 to 100																																						
$\tan\delta$ (max.)	0.80	0.60	0.50	0.40	0.30	0.20																																							
	<table border="1"> <tr> <th rowspan="2"><math>\tan\delta</math> (max.)</th> <th rowspan="2"><math>\phi D</math></th> <th colspan="2">Rated voltage (V)</th> </tr> <tr> <th>160 to 250</th> <th>315 to 450</th> </tr> <tr> <td></td> <td>22 to 30</td> <td>0.10</td> <td>0.15</td> </tr> <tr> <td></td> <td>35</td> <td>0.15</td> <td>0.15</td> </tr> </table> <p>(20°C, 120Hz)</p>	$\tan\delta$ (max.)	$\phi D$	Rated voltage (V)		160 to 250	315 to 450		22 to 30	0.10	0.15		35	0.15	0.15																														
$\tan\delta$ (max.)	$\phi D$			Rated voltage (V)																																									
		160 to 250	315 to 450																																										
	22 to 30	0.10	0.15																																										
	35	0.15	0.15																																										
Characteristics at high and low temperature	<table border="1"> <tr> <th rowspan="2">Impedance ratio (max.)</th> <th colspan="7">Rated voltage (V)</th> </tr> <tr> <th>10</th> <th>16 to 35</th> <th>50 to 100</th> <th>160 to 200</th> <th>250 to 400</th> <th>450</th> </tr> <tr> <td></td> <td colspan="7">Z<math>-25^{\circ}C</math> / Z<math>+20^{\circ}C</math></td> </tr> <tr> <td></td> <td>5</td> <td>4</td> <td>3</td> <td>3</td> <td>4</td> <td>4</td> </tr> <tr> <td></td> <td colspan="7">Z<math>-40^{\circ}C</math> / Z<math>+20^{\circ}C</math></td> </tr> <tr> <td></td> <td>18</td> <td>15</td> <td>10</td> <td>6</td> <td>8</td> <td>—</td> </tr> </table> <p>(120Hz)</p>	Impedance ratio (max.)	Rated voltage (V)							10	16 to 35	50 to 100	160 to 200	250 to 400	450		Z $-25^{\circ}C$ / Z $+20^{\circ}C$								5	4	3	3	4	4		Z $-40^{\circ}C$ / Z $+20^{\circ}C$								18	15	10	6	8	—
Impedance ratio (max.)	Rated voltage (V)																																												
	10	16 to 35	50 to 100	160 to 200	250 to 400	450																																							
	Z $-25^{\circ}C$ / Z $+20^{\circ}C$																																												
	5	4	3	3	4	4																																							
	Z $-40^{\circ}C$ / Z $+20^{\circ}C$																																												
	18	15	10	6	8	—																																							
Endurance (85°C) (Applied ripple current)	Test time	2000 hours																																											
	Leakage current	The initial specified value or less																																											
	Percentage of capacitance change	Within $\pm 20\%$ of initial value																																											
	Tangent of the loss angle	200% or less of the initial specified value																																											
Shelf life (85°C)	Test time	1000 hours																																											
	Leakage current	The initial specified value or less																																											
	Percentage of capacitance change	Within $\pm 15\%$ of initial value																																											
	Tangent of the loss angle	150% or less of the initial specified value																																											
Voltage application treatment																																													
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)																																												

Large Capacitance Aluminum Electrolytic Capacitors

### Outline Drawing

Unit: mm



Part numbering system (example: 400V221M S43 #)							
LA5	—	400	V	221	M	S43	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)				
	50	120	1k	10k	20k
100 or less	0.95	1	1.10	1.15	1.15
160 to 250	0.87	1	1.11	1.18	1.20
315 or more	0.80	1	1.14	1.19	1.20

\* There are overseas factory product only on this page.

Standard Ratings

Case φ D(L)(mm)	Casing symbol	10			16			25			35			50			63			80			100		
		Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current
		μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms
22x20	S21	8200	0.101	2.0	5600	0.118	1.9	3900	0.128	1.8	2700	0.154	1.6	1800	0.184	1.6	1500	0.166	1.7	1000	0.249	1.5	560	0.444	1.3
22x25	S22	12000	0.069	2.5	8200	0.081	2.4	5600	0.089	2.3	3900	0.106	2.1	2700	0.123	2.1	2200	0.113	2.2	1500	0.166	1.9	820	0.303	1.7
22x30	S23	15000	0.055	3.0	12000	0.055	3.0	8200	0.061	2.8	4700	0.088	2.4	3900	0.085	2.6	2700	0.092	2.5	1800	0.138	2.2	1200	0.207	2.1
22x35	S24	22000	0.038	3.7	15000	0.044	3.4	10000	0.050	3.2	6800	0.061	2.9	4700	0.071	3.1	3300	0.075	2.9	2200	0.113	2.5	1500	0.166	2.5
22x40	S25	—	—	—	18000	0.037	3.9	12000	0.041	3.7	8200	0.051	3.3	5600	0.059	3.4	3900	0.064	3.3	2700	0.092	2.8	1800	0.138	2.8
22x45	S26	27000	0.031	4.3	—	—	—	—	—	—	—	—	—	—	—	—	4700	0.053	3.7	3300	0.075	3.2	2200	0.113	3.2
22x50	S27	33000	0.025	4.9	22000	0.030	4.5	15000	0.033	4.3	10000	0.041	3.9	6800	0.049	3.9	5600	0.044	4.1	3900	0.064	3.6	—	—	—
25x20	S31	12000	0.069	2.5	8200	0.081	2.4	5600	0.089	2.2	3900	0.106	2.0	2700	0.123	2.1	1800	0.138	2.0	1200	0.207	1.7	820	0.303	1.7
25x25	S32	18000	0.046	3.2	12000	0.055	2.9	8200	0.061	2.8	5600	0.074	2.6	3900	0.085	2.6	2700	0.092	2.0	1800	0.138	2.2	1200	0.207	2.1
25x30	S33	22000	0.038	3.7	15000	0.044	3.4	10000	0.050	3.2	6800	0.061	2.9	4700	0.071	3.0	3900	0.064	3.2	2200	0.113	2.5	1500	0.166	2.5
25x35	S34	27000	0.031	4.2	18000	0.037	3.9	12000	0.041	3.7	8200	0.051	3.3	5600	0.059	3.4	4700	0.053	3.6	3300	0.075	3.1	1800	0.138	2.8
25x40	S35	33000	0.025	4.8	22000	0.030	4.4	15000	0.033	4.2	10000	0.041	3.8	6800	0.049	3.8	5600	0.044	4.0	3900	0.064	3.5	2200	0.113	3.2
25x45	S36	39000	0.021	5.4	27000	0.025	5.0	18000	0.028	4.7	12000	0.035	4.3	8200	0.040	4.3	6800	0.037	4.6	—	—	—	2700	0.092	2.9
25x50	S37	47000	0.018	6.0	—	—	—	22000	0.023	5.4	15000	0.028	4.9	10000	0.033	4.9	—	—	—	4700	0.053	4.0	3300	0.075	4.1
30x20	S41	18000	0.046	3.3	12000	0.055	3.0	8200	0.061	2.9	5600	0.074	2.6	3900	0.085	2.7	2700	0.092	2.6	1800	0.138	2.2	1200	0.207	2.2
30x25	S42	27000	0.031	4.2	18000	0.037	3.9	12000	0.041	3.7	8200	0.051	3.3	5600	0.059	3.4	3900	0.064	3.3	2700	0.092	2.9	1800	0.138	2.8
30x30	S43	33000	0.025	4.9	22000	0.030	4.4	15000	0.033	4.3	10000	0.041	3.8	6800	0.049	3.9	5600	0.044	4.1	3900	0.064	3.6	2200	0.113	3.2
30x35	S44	39000	0.021	5.5	27000	0.025	5.1	18000	0.028	4.8	12000	0.035	4.3	8200	0.040	4.4	6800	0.037	4.6	4700	0.053	4.0	2700	0.092	3.7
30x40	S45	47000	0.018	6.1	33000	0.020	5.8	22000	0.023	5.5	15000	0.028	5.0	10000	0.033	5.0	8200	0.030	5.2	5600	0.044	4.5	3300	0.075	4.2
30x45	S46	56000	0.015	6.9	39000	0.017	6.4	27000	0.018	6.2	18000	0.023	5.6	12000	0.028	5.6	10000	0.025	5.9	6800	0.037	5.1	3900	0.064	4.7
30x50	S47	68000	0.012	7.7	47000	0.014	7.2	33000	0.015	7.0	22000	0.019	6.3	15000	0.022	6.4	—	—	—	—	—	—	4700	0.053	5.2
35x20	S51	22000	0.038	3.9	15000	0.044	3.7	10000	0.050	3.5	6800	0.061	3.1	4700	0.071	3.2	3900	0.064	3.4	2700	0.092	3.0	1500	0.166	2.7
35x25	S52	33000	0.025	5.0	22000	0.030	4.6	15000	0.033	4.4	10000	0.041	4.0	6800	0.049	4.0	5600	0.044	4.2	3900	0.064	3.7	2200	0.113	3.4
35x30	S53	47000	0.018	6.2	33000	0.020	5.8	22000	0.023	5.5	15000	0.028	5.0	10000	0.033	5.0	8200	0.037	4.8	4700	0.053	4.2	3300	0.075	4.3
35x35	S54	56000	0.015	7.0	39000	0.017	6.5	27000	0.018	6.2	18000	0.023	5.7	12000	0.028	5.7	10000	0.030	5.5	6800	0.044	4.7	3900	0.064	4.8
35x40	S55	68000	0.012	7.9	47000	0.014	7.4	33000	0.015	7.2	22000	0.019	6.4	15000	0.022	6.5	10000	0.025	6.2	6800	0.037	5.3	4700	0.053	5.4
35x45	S56	82000	0.010	8.9	56000	0.012	8.2	39000	0.013	8.0	—	—	—	18000	0.018	7.3	12000	0.021	6.9	8200	0.030	6.0	5600	0.044	6.0
35x50	S57	—	—	—	—	—	—	—	—	—	27000	0.015	7.4	—	—	—	15000	0.017	7.9	10000	0.025	6.8	—	—	—

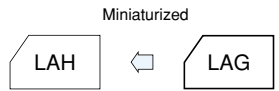
Large Capacitance Aluminum Electrolytic Capacitors

Case φ D(L)(mm)	Casing symbol	160			180			200			250			315			350			400			450		
		Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current
		μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms
22x20	S21	270	0.614	1.2	220	0.754	1.1	180	0.922	1.0	150	1.106	0.94	100	2.488	0.78	68	3.659	0.61	56	4.443	0.54	47	5.294	0.49
22x25	S22	390	0.425	1.5	330	0.503	1.4	270	0.614	1.3	220	0.754	1.2	150	1.659	1.0	100	2.488	0.78	82	3.034	0.69	68	3.659	0.62
22x30	S23	560	0.296	1.9	470	0.353	1.8	390	0.425	1.6	270	0.614	1.4	180	1.382	1.1	150	1.659	1.0	120	2.073	0.86	82	3.034	0.71
22x35	S24	680	0.244	2.2	560	0.296	2.0	470	0.353	1.9	330	0.503	1.6	220	1.131	1.3	180	1.382	1.1	150	1.659	1.0	100	2.488	0.82
22x40	S25	820	0.202	2.5	680	0.244	2.3	560	0.296	2.1	390	0.425	1.8	270	0.922	1.5	220	1.131	1.3	180	1.382	1.1	120	2.073	0.92
22x45	S26	—	—	—	820	0.202	2.6	680	0.244	2.4	470	0.353	2.0	330	0.754	1.7	—	—	—	220	1.131	1.3	150	1.659	1.1
22x50	S27	1000	0.166	2.9	—	—	—	820	0.202	2.6	560	0.296	2.2	—	—	—	270	0.922	1.5	—	—	—	180	1.382	1.2
25x20	S31	390	0.425	1.5	330	0.503	1.4	270	0.614	1.3	180	0.922	1.1	120	2.073	0.88	100	2.488	0.77	82	3.034	0.69	56	4.443	0.57
25x25	S32	560	0.296	1.9	470	0.353	1.8	390	0.425	1.6	270	0.614	1.4	180	1.382	1.1	150	1.659	0.99	120	2.073	0.87	82	3.034	0.72
25x30	S33	680	0.244	2.2	560	0.296	2.0	560	0.296	2.0	390	0.425	1.7	270	0.922	1.4	180	1.382	1.1	150	1.659	1.0	120	2.073	0.91
25x35	S34	820	0.202	2.5	680	0.244	2.3	680	0.244	2.3	470	0.353	2.0	330	0.754	1.7	220	1.131	1.3	180	1.382	1.1	150	1.659	1.0
25x40	S35	1000	0.166	2.8	820	0.202	2.6	820	0.202	2.6	560	0.296	2.2	390	0.638	1.8	270	0.922	1.5	220	1.131	1.3	180	1.382	1.2
25x45	S36	1200	0.138	3.2	1000	0.166	2.9	—	—	—	680	0.244	2.5	—	—	—	330	0.754	1.7	270	0.922	1.5	—	—	—
25x50	S37	1500	0.111	3.6	1200	0.138	3.3	1000	0.166	3.0	—	—	—	470	0.529	2.1	390	0.638	1.9	330	0.754	1.7	220	1.131	1.4
30x20	S41	560	0.296	2.0	470	0.353	1.8	390	0.425	1.7	270	0.614	1.4	180	1.382	1.2	150	1.659	1.0	120	2.073	0.93	82	3.034	0.77
30x25	S42	820	0.202	2.5	680	0.244	2.3	560	0.296	2.1	390	0.425	1.8	270	0.922	1.5	220	1.131	1.3	180	1.382	1.2	120	2.073	0.97
30x30	S43	1000	0.166	2.9	820	0.202	2.6	820	0.202	2.7	560	0.296	2.3	390	0.638	1.9	270	0.922	1.5	220	1.131	1.4	180	1.382	1.2
30x35	S44	1200	0.138	3.3	1200	0.138	3.3	1000	0.166	3.0	680	0.244	2.6	470	0.529	2.1	330	0.754	1.7	270	0.922	1.6	220	1.131	1.4
30x40	S45	1500	0.111	3.7	—	—	—	1200	0.138	3.4	820	0.202	2.9	560	0.444	2.4	390								

## High-Reliability High-Ripple Capacitors

GREEN CAP 105°C 2000hours

- High-reliability, high-ripple capacitors.
- Guarantees 2000 hours at 105°C.



Marking color : White print on a black sleeve

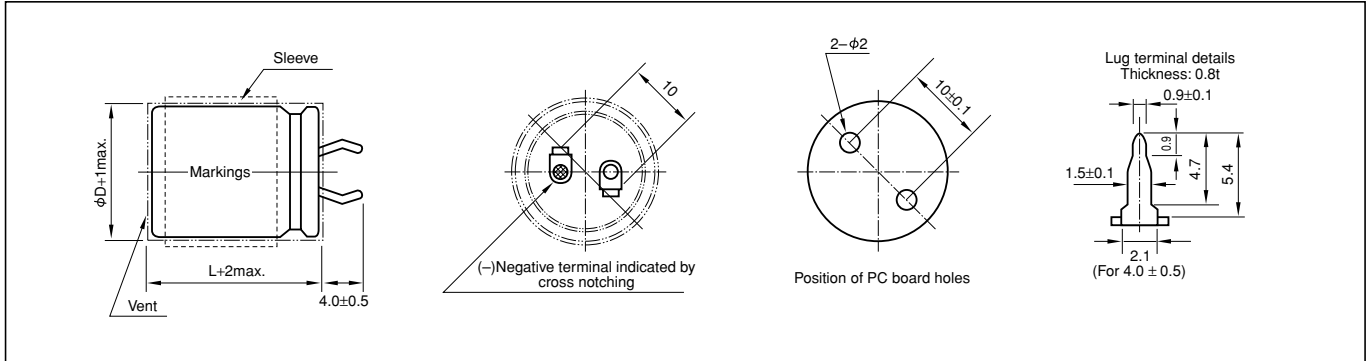
### Specifications

Item	Performance	
Category temperature range (°C)	-25 to +105	
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)	
Leakage current (µA)	Less than 0.02CV or 3mA whichever is smaller(after 5 minutes) C: Rated capacitance(µF), V: Rated voltage(V) (20°C)	
Tangent of loss angle (tanδ)	Rated voltage (V)	160 180 200 250 315 350 385 400
	tanδ (max.)	0.10 0.10 0.10 0.15 0.15 0.15 0.15 0.15
0.15 for capacitors with ø35 and a WV equal to or less than 200 (20°C, 120Hz)		
Characteristics at high and low temperature	Percentage of capacitance change (%)	-25°C Within ±30% of the value at 20°C
	Impedance ratio (max.)	Z-25°C / Z+20°C 4 (120Hz)
Endurance (105°C) (Applied ripple current)	Test time	2000 hours
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±20% of initial value
	Tangent of the loss angle	200% or less of the initial specified value
Shelf life (105°C)	Test time	1000 hours
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±15% of initial value
	Tangent of the loss angle	150% or less of the initial specified value
Voltage application treatment		
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)	

Large Capacitance Aluminum Electrolytic Capacitors

### Outline Drawing

Unit: mm



Part numbering system (example: 200V471µF)

LAG	—	200	V	471	M	S3	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

### Coefficient of Frequency for Rated Ripple Current

Frequency(Hz)	50	120	1k	10k	30k
Rated voltage(V)					
160 to 250	0.87	1	1.11	1.18	1.20
315 or more	0.80	1	1.14	1.19	1.20

• The electric characteristics are described on page 120.

\* There are overseas factory product only on this page.

Standard Ratings

Rated voltage(V)		160				180				200				250			
Case ø DxL(mm)	Item Casing symbol	Rated capacitance	ESR	Impedance (max.)	Rated ripple current	Rated capacitance	ESR	Impedance (max.)	Rated ripple current	Rated capacitance	ESR	Impedance (max.)	Rated ripple current	Rated capacitance	ESR	Impedance (max.)	Rated ripple current
		μF	Ω	mΩ/100kHz	Arms	μF	Ω	mΩ/100kHz	Arms	μF	Ω	mΩ/100kHz	Arms	μF	Ω	mΩ/100kHz	Arms
22x25	S1	270	0.614	460	1.16	220	0.754	460	1.08	180	0.922	460	1.08	120	2.073	460	0.94
22x30	S2	330	0.503	420	1.43	270	0.614	420	1.30	270	0.614	420	1.30	180	1.382	420	1.10
22x35	S3	390	0.425	380	1.52	390	0.425	380	1.50	330	0.503	380	1.41	220	1.131	380	1.13
22x40	S4	470	0.353	340	1.62	470	0.353	340	1.62	390	0.425	340	1.50	270	0.922	340	1.20
22x45	S5	—	—	—	—	560	0.296	320	1.69	470	0.353	320	1.58	330	0.754	320	1.26
22x50	S6	680	0.244	290	1.81	—	—	—	—	560	0.296	290	1.68	390	0.638	290	1.37
25x25	S1	390	0.425	460	1.55	270	0.614	460	1.35	270	0.614	460	1.35	180	1.382	460	1.15
25x30	S2	470	0.353	360	1.73	390	0.425	360	1.62	330	0.503	360	1.47	220	1.131	360	1.30
25x35	S3	560	0.296	330	1.81	470	0.353	330	1.69	470	0.353	330	1.65	330	0.754	330	1.41
25x40	S4	680	0.244	290	1.98	560	0.296	290	1.72	560	0.296	290	1.80	390	0.638	290	1.52
25x45	S5	820	0.202	270	2.04	680	0.244	270	1.78	—	—	—	—	470	0.529	270	1.59
25x50	S6	—	—	—	—	820	0.202	230	1.91	680	0.244	270	1.78	—	—	—	—
30x25	S1	560	0.296	310	1.82	390	0.425	310	1.67	390	0.425	310	1.56	220	1.131	310	1.30
30x30	S2	680	0.244	280	1.98	560	0.296	280	1.74	560	0.296	280	1.82	330	0.754	280	1.36
30x35	S3	820	0.202	240	2.14	680	0.244	240	1.85	680	0.244	240	1.99	470	0.529	240	1.57
30x40	S4	1000	0.166	200	2.22	820	0.202	200	2.01	820	0.202	200	2.12	560	0.444	200	1.76
30x45	S5	1200	0.138	170	2.46	1000	0.166	170	2.19	—	—	—	—	—	—	—	—
30x50	S6	—	—	—	—	1200	0.138	150	2.36	1000	0.166	150	2.22	820	0.303	150	1.87
35x30	S1	820	0.303	180	2.40	820	0.303	180	2.16	680	0.366	180	2.07	470	0.529	180	1.56
35x35	S2	1000	0.249	150	2.53	1000	0.249	150	2.34	820	0.303	150	2.22	680	0.366	150	1.82
35x40	S3	1500	0.166	120	2.97	1200	0.207	120	2.56	1000	0.249	120	2.42	820	0.303	120	1.98
35x45	S4	—	—	—	—	—	—	—	—	—	—	—	—	1000	0.249	90	2.10
35x50	S5	1800	0.138	80	3.10	1500	0.166	80	2.75	1500	0.166	80	2.70	—	—	—	—

Large Capacitance Aluminum Electrolytic Capacitors

Rated voltage(V)		315				350				385				400			
Case ø DxL(mm)	Item Casing symbol	Rated capacitance	ESR	Impedance (max.)	Rated ripple current	Rated capacitance	ESR	Impedance (max.)	Rated ripple current	Rated capacitance	ESR	Impedance (max.)	Rated ripple current	Rated capacitance	ESR	Impedance (max.)	Rated ripple current
		μF	Ω	mΩ/100kHz	Arms	μF	Ω	mΩ/100kHz	Arms	μF	Ω	mΩ/100kHz	Arms	μF	Ω	mΩ/100kHz	Arms
22x25	S1	82	3.034	850	0.56	68	3.659	850	0.56	68	3.659	850	0.56	56	4.443	850	0.47
22x30	S2	120	2.073	800	0.70	100	2.488	800	0.70	82	3.034	800	0.63	68	3.659	800	0.56
22x35	S3	150	1.659	740	0.78	120	2.073	740	0.73	120	2.073	740	0.73	100	2.488	740	0.64
22x40	S4	180	1.382	700	0.89	150	1.659	700	0.79	150	1.659	700	0.79	120	2.073	700	0.70
22x45	S5	—	—	—	—	180	1.382	640	0.81	—	—	—	—	—	—	—	—
22x50	S6	220	1.131	600	0.93	220	1.131	600	0.93	180	1.382	600	0.84	150	1.659	600	0.78
25x25	S1	120	2.073	800	0.70	100	2.488	800	0.70	100	2.488	800	0.70	—	—	—	—
25x30	S2	150	1.659	720	0.82	150	1.659	720	0.82	120	2.073	720	0.73	100	2.488	720	0.70
25x35	S3	180	1.382	660	0.89	180	1.382	660	0.89	150	1.659	660	0.81	120	2.073	660	0.73
25x40	S4	220	1.131	600	0.97	220	1.131	600	0.97	180	1.382	600	0.88	150	1.659	600	0.82
25x45	S5	270	0.922	560	1.00	—	—	—	—	220	1.131	560	0.91	180	1.382	560	0.87
25x50	S6	330	0.754	500	1.16	270	0.922	500	1.01	270	0.922	500	1.01	220	1.131	500	0.94
30x25	S1	150	1.659	640	0.82	150	1.659	640	0.82	150	1.659	640	0.82	—	—	—	—
30x30	S2	220	1.131	580	1.01	180	1.382	580	0.90	180	1.382	580	0.90	150	1.659	580	0.83
30x35	S3	270	0.922	520	1.05	270	0.922	520	1.05	220	1.131	520	0.95	180	1.382	520	0.86
30x40	S4	330	0.754	440	1.21	—	—	—	—	270	0.922	440	1.09	220	1.131	440	0.95
30x45	S5	390	0.638	380	1.26	330	0.754	380	1.16	330	0.754	380	1.16	270	0.922	380	1.11
30x50	S6	470	0.529	340	1.32	390	0.638	340	1.26	390	0.638	340	1.26	—	—	—	—
35x30	S1	270	0.922	420	1.01	270	0.922	420	1.01	270	0.922	420	1.01	180	1.382	420	0.91
35x35	S2	390	0.638	340	1.26	330	0.754	340	1.16	330	0.754	340	1.16	270	0.922	340	1.13
35x40	S3	470	0.529	280	1.32	390	0.638	280	1.26	390	0.638	280	1.26	330	0.754	280	1.26
35x45	S4	—	—	—	—	470	0.529	260	1.35	470	0.529	260	1.35	—	—	—	—
35x50	S5	560	0.444	200	1.52	560	0.444	200	1.51	560	0.444	200	1.51	470	0.529	200	1.50

(Note) ESR : 20°C, 120Hz ; Rated ripple current : 105°C, 120Hz ; Impedance : 20°C

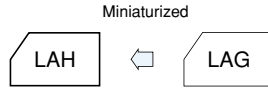
\* There are overseas factory product only on this page.

**NOTE**  
Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

## Miniaturized, High-Reliability, High-Ripple Capacitors

GREEN CAP 105°C 2000hours

- High-reliability, high-ripple capacitors.
- Guarantees 2000 hours at 105°C.



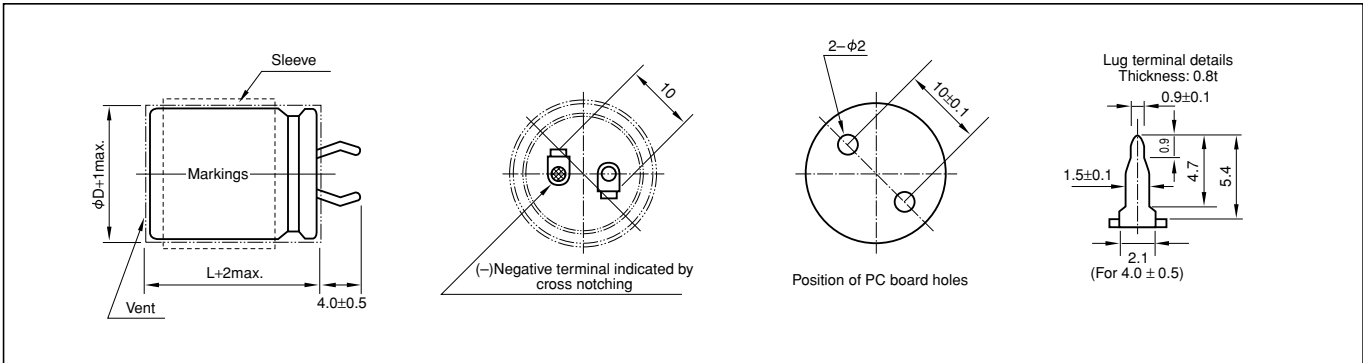
Marking color : White print on a black sleeve

### Specifications

Item	Performance							
Category temperature range (°C)	-40 to +105 (-25 to +105 at 160V or more)							
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)							
Leakage current (µA)	Less than 0.02CV or 3mA whichever is smaller(after 5 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)							
Tangent of loss angle (tanδ)	Rated voltage (V)	16	25	35	50	63 to 100	160 to 250	400 to 450
	tanδ (max.)	0.50	0.40	0.35	0.30	0.20	0.15	0.20
Characteristics at high and low temperature	Rated voltage (V)	16 to 100		160 to 200		250 to 400		(120Hz)
	Impedance ratio (max.)	Z-25°C / Z+20°C		4		4		
Endurance (105°C) (Applied ripple current)	Test time	2000 hours						
	Leakage current	The initial specified value or less						
	Percentage of capacitance change	Within ±20% of initial value						
	Tangent of the loss angle	200% or less of the initial specified value						
Shelf life (105°C)	Test time	1000 hours						
	Leakage current	The initial specified value or less						
	Percentage of capacitance change	Within ±15% of initial value						
	Tangent of the loss angle	150% or less of the initial specified value						
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)							

### Outline Drawing

Unit: mm



Part numbering system (example: 200V470µF)

LAH	—	200	V	471	M	S2	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

### Coefficient of Frequency for Rated Ripple Current

Frequency(Hz)	50	120	1k	10k	30k
Rated voltage(V)					
100 or less	0.95	1	1.10	1.15	1.15
160 to 250	0.87	1	1.11	1.18	1.20
315 or more	0.80	1	1.14	1.19	1.20

• The electric characteristics are described on page 120.

\* There are overseas factory product only on this page.



Standard Ratings

Rated voltage(V)		16			25			35			50		
Case ø DxL(mm)	Item Casing symbol	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current
		μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms
22x25	S1	6800	0.122	1.60	4700	0.141	1.55	3300	0.176	1.43	1800	0.184	1.31
22x30	S2	10000	0.083	1.99	6800	0.098	1.91	3900	0.149	1.65	2700	0.123	1.70
22x35	S3	12000	0.069	2.28	8200	0.081	2.14	5600	0.104	2.02	3300	0.101	1.98
22x40	S4	15000	0.055	2.64	10000	0.066	2.40	6800	0.085	2.28	3900	0.085	2.25
22x45	S5	18000	0.046	2.98	12000	0.055	2.69	—	—	—	4700	0.071	2.56
22x50	S6	—	—	—	—	—	—	8200	0.071	2.67	5600	0.059	2.89
25x25	S1	10000	0.083	1.99	6800	0.098	1.91	4700	0.124	1.78	2700	0.123	1.70
25x30	S2	12000	0.069	2.30	8200	0.081	2.16	5600	0.104	2.04	3300	0.101	2.00
25x35	S3	15000	0.055	2.68	10000	0.066	2.44	6800	0.085	2.31	3900	0.085	2.28
25x40	S4	18000	0.046	3.04	12000	0.055	2.74	8200	0.071	2.60	5600	0.059	2.81
25x45	S5	22000	0.038	3.40	15000	0.044	3.15	10000	0.058	2.92	—	—	—
25x50	S6	27000	0.031	3.81	18000	0.037	3.54	12000	0.048	3.26	6800	0.049	3.37
30x25	S1	12000	0.069	2.38	8200	0.081	2.25	5600	0.104	2.12	3900	0.085	2.22
30x30	S2	18000	0.046	3.00	12000	0.055	2.70	8200	0.071	2.56	4700	0.071	2.58
30x35	S3	22000	0.038	3.39	15000	0.044	3.13	10000	0.058	2.92	5600	0.059	2.95
30x40	S4	27000	0.031	3.83	18000	0.037	3.54	12000	0.048	3.28	6800	0.049	3.39
30x45	S5	33000	0.025	4.30	22000	0.030	4.24	15000	0.039	3.74	8200	0.040	3.71
30x50	S6	39000	0.021	4.74	—	—	—	—	—	—	10000	0.033	4.09
35x25	S1	18000	0.046	3.10	12000	0.055	2.80	8200	0.071	2.78	4700	0.071	2.67
35x30	S2	27000	0.031	3.74	15000	0.044	3.22	12000	0.048	3.20	6800	0.049	3.31
35x35	S3	33000	0.025	4.24	22000	0.030	3.96	15000	0.039	3.69	8200	0.040	3.66
35x40	S4	39000	0.021	4.72	—	—	—	18000	0.032	4.16	10000	0.033	4.07
35x45	S5	47000	0.018	5.27	27000	0.025	4.75	—	—	—	12000	0.028	4.50
35x50	S6	—	—	—	33000	0.020	5.39	22000	0.026	4.92	—	—	—

Large Capacitance Aluminum Electrolytic Capacitors

Rated voltage(V)		63			80			100		
Case ø DxL(mm)	Item Casing symbol	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current
		μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms
22x25	S1	1200	0.207	1.25	820	0.303	1.11	560	0.444	1.07
22x30	S2	1800	0.138	1.52	1200	0.207	1.39	820	0.303	1.35
22x35	S3	2200	0.113	1.73	1500	0.166	1.61	1000	0.249	1.54
22x40	S4	2700	0.092	1.97	1800	0.138	1.83	1200	0.207	1.74
22x45	S5	—	—	—	2200	0.113	2.09	1500	0.166	1.99
22x50	S6	3300	0.075	2.32	—	—	—	—	—	—
25x25	S1	1800	0.138	1.52	1200	0.207	1.39	820	0.303	1.35
25x30	S2	2200	0.113	1.75	1500	0.166	1.62	1000	0.249	1.56
25x35	S3	2700	0.092	1.99	2200	0.113	2.01	1200	0.207	1.76
25x40	S4	3300	0.075	2.27	—	—	—	1500	0.166	2.03
25x45	S5	3900	0.064	2.54	2700	0.092	2.43	1800	0.138	2.28
25x50	S6	4700	0.053	2.88	3300	0.075	2.76	2200	0.113	2.57
30x25	S1	2700	0.092	1.93	1800	0.138	1.81	1200	0.207	1.71
30x30	S2	3300	0.075	2.24	2200	0.113	2.10	1500	0.166	2.00
30x35	S3	3900	0.064	2.55	2700	0.092	2.43	1800	0.138	2.27
30x40	S4	4700	0.053	2.90	3300	0.075	2.78	2200	0.113	2.59
30x45	S5	5600	0.044	3.28	3900	0.064	3.12	2700	0.092	2.94
30x50	S6	6800	0.037	3.73	4700	0.053	3.56	3300	0.075	3.32
35x25	S1	3300	0.075	2.41	2200	0.113	2.17	1500	0.166	2.07
35x30	S2	4700	0.053	2.83	3300	0.075	2.71	2200	0.113	2.52
35x35	S3	5600	0.044	3.24	3900	0.064	3.07	2700	0.092	2.90
35x40	S4	6800	0.037	3.71	4700	0.053	3.50	3300	0.075	3.31
35x45	S5	8200	0.030	4.16	5600	0.044	3.87	3900	0.064	3.69
35x50	S6	10000	0.025	4.69	6800	0.037	4.19	4700	0.053	4.14

(Note) ESR : 20°C, 120Hz ; Rated ripple current : 105°C, 120Hz

• The standard ratings follow the next page.

\* There are overseas factory product only on this page.

**NOTE**  
Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

## Standard Ratings

Rated voltage(V)		160			180			200			
Case ø DxDL(mm)	Casing symbol	Item	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current
			μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms
22x25	S1		330	0.754	1.16	270	0.922	1.08	220	1.131	1.08
22x30	S2		390	0.638	1.43	330	0.754	1.30	330	0.754	1.30
22x35	S3		470	0.529	1.52	470	0.529	1.50	390	0.638	1.41
22x40	S4		560	0.444	1.62	560	0.444	1.62	470	0.529	1.50
22x45	S5		680	0.366	1.70	—	—	—	560	0.444	1.58
22x50	S6		820	0.303	1.81	680	0.366	1.76	680	0.366	1.68
25x25	S1		470	0.529	1.55	390	0.638	1.35	330	0.754	1.35
25x30	S2		560	0.444	1.73	470	0.529	1.62	470	0.529	1.47
25x35	S3		680	0.366	1.81	560	0.444	1.69	560	0.444	1.65
25x40	S4		820	0.303	1.98	680	0.366	1.72	680	0.366	1.80
25x45	S5		1000	0.249	2.04	820	0.303	1.78	—	—	—
25x50	S6		1200	0.207	2.12	1000	0.249	1.91	820	0.303	1.87
30x25	S1		680	0.366	1.82	560	0.444	1.67	470	0.529	1.56
30x30	S2		820	0.303	1.98	680	0.366	1.74	680	0.366	1.82
30x35	S3		1000	0.249	2.14	820	0.303	1.85	820	0.303	1.99
30x40	S4		1200	0.207	2.22	1000	0.249	2.01	—	—	—
30x45	S5		1500	0.166	2.46	1200	0.207	2.19	1000	0.249	2.17
30x50	S6		—	—	—	1500	0.166	2.36	1200	0.207	2.22
35x25	S1		820	0.303	1.93	680	0.366	1.92	680	0.366	1.96
35x30	S2		1200	0.249	2.40	1000	0.249	2.16	820	0.303	2.07
35x35	S3		1500	0.166	2.53	1200	0.207	2.34	1000	0.249	2.22
35x40	S4		—	—	—	1500	0.166	2.56	1200	0.207	2.42
35x45	S5		1800	0.138	2.98	1800	0.138	2.67	1500	0.166	2.59
35x50	S6		2200	0.113	3.10	—	—	—	1800	0.138	2.70

Large Capacitance Aluminum Electrolytic Capacitors

Rated voltage(V)		250			400			450			
Case ø DxDL(mm)	Casing symbol	Item	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current
			μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms
22x25	S1		180	1.382	0.94	68	4.879	0.47	56	5.924	0.47
22x30	S2		220	1.131	1.10	82	4.046	0.56	68	4.879	0.56
22x35	S3		270	0.922	1.13	120	2.765	0.64	82	4.046	0.64
22x40	S4		330	0.754	1.20	150	2.212	0.70	100	3.317	0.70
22x45	S5		390	0.638	1.26	—	—	—	120	2.765	0.73
22x50	S6		470	0.529	1.37	180	1.843	0.78	150	2.212	0.78
25x25	S1		220	1.131	1.15	82	4.046	0.65	68	4.879	0.65
25x30	S2		330	0.754	1.30	120	2.765	0.70	100	3.317	0.70
25x35	S3		390	0.638	1.41	150	2.212	0.73	120	2.765	0.73
25x40	S4		470	0.529	1.52	180	1.843	0.82	150	2.212	0.82
25x45	S5		560	0.444	1.59	220	1.508	0.87	180	1.843	0.87
25x50	S6		680	0.366	1.66	270	1.229	0.94	220	1.508	0.94
30x25	S1		330	0.754	1.30	120	2.765	0.78	100	3.317	0.78
30x30	S2		470	0.529	1.36	180	1.843	0.83	150	2.212	0.83
30x35	S3		560	0.444	1.57	220	1.508	0.86	180	1.843	0.83
30x40	S4		680	0.366	1.76	270	1.229	0.95	220	1.508	0.95
30x45	S5		820	0.303	1.83	330	1.005	1.11	270	1.229	1.11
30x50	S6		1000	0.249	1.87	390	0.851	1.15	330	1.005	1.15
35x25	S1		470	0.529	1.40	180	1.843	0.86	150	2.212	0.86
35x30	S2		560	0.444	1.56	270	1.229	0.91	220	1.508	0.91
35x35	S3		820	0.303	1.82	330	1.005	1.13	270	1.229	1.13
35x40	S4		1000	0.249	1.99	390	0.851	1.26	330	1.005	1.26
35x45	S5		1200	0.207	2.10	470	0.706	1.31	390	0.851	1.31
35x50	S6		—	—	—	560	0.592	1.50	470	0.706	1.50

(Note) ESR : 20°C, 120Hz ; Rated ripple current : 105°C, 120Hz

\* There are overseas factory product only on this page.

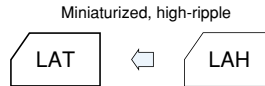
105°C, Miniaturized, High-Reliability, High-Ripple Capacitors

GREEN CAP 105°C 2000hours

- Best suited as input filters for various power supplies
- Guarantees 2000 hours at 105°C.



Marking color : White print on a black sleeve



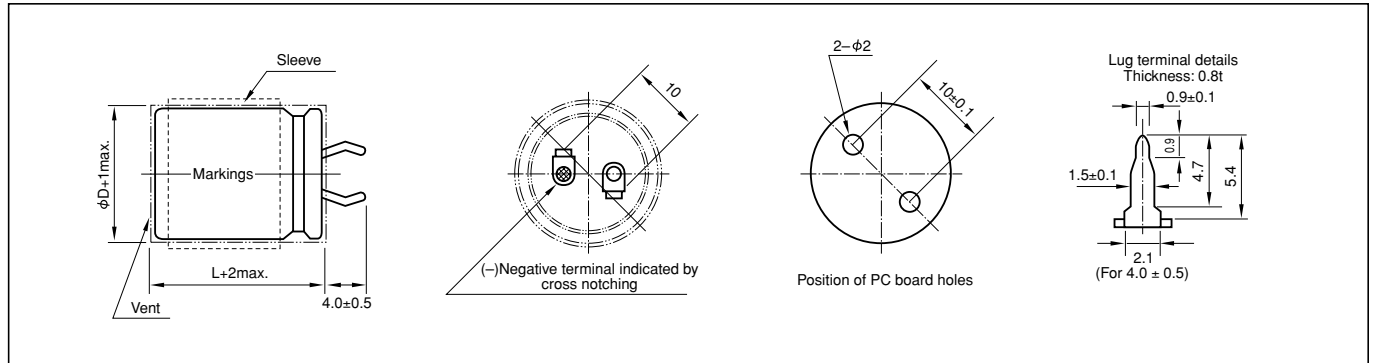
Specifications

Item	Performance	
Category temperature range (°C)	-25 to +105	
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)	
Leakage current (µA)	Less than 0.02CV or 3mA whichever is smaller(after 5 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)	
Tangent of loss angle (tanδ)	Rated voltage (V)	160    180    200    250    315    400
	tanδ (max.)	0.15    0.15    0.15    0.15    0.20    0.20
(20°C, 120Hz)		
Characteristics at high and low temperature	Percentage of capacitance change (%)	-25°C    Within ±30% of the value at 20°C
	Impedance ratio (max.)	Z-25°C / Z+20°C    4
(120Hz)		
Endurance (105°C) (Applied ripple current)	Test time	2000 hours
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±20% of initial value
	Tangent of the loss angle	200% or less of the initial specified value
Shelf life (105°C)	Test time	1000 hours
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±15% of initial value
	Tangent of the loss angle	150% or less of the initial specified value
	Voltage application treatment	
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)	

Large Capacitance Aluminum Electrolytic Capacitors

Outline Drawing

Unit: mm



Part numbering system (example: 200V470µF)

LAT	—	200	V	471	M	S24	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

Coefficient of Frequency for Rated Ripple Current

Rated voltage(V) \ Frequency(Hz)	50	120	1k	10k	30k
160 to 250	0.87	1	1.11	1.18	1.20
315 or more	0.80	1	1.14	1.19	1.20

• The standard ratings are described on the next page.

\* There are overseas factory product only on this page.

**NOTE**  
Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

### Standard Ratings

Rated voltage(V)		160			180			200			
Case ø DxDL(mm)	Casing symbol	Item	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current
			μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms
22x25	S22		390	0.638	1.30	330	0.754	1.20	270	0.922	1.10
22x30	S23		470	0.529	1.47	390	0.638	1.30	390	0.638	1.31
22x35	S24		560	0.444	1.58	470	0.529	1.50	470	0.529	1.50
22x40	S25		680	0.366	1.71	560	0.444	1.62	560	0.444	1.56
22x45	S26		820	0.303	2.00	680	0.366	1.70	680	0.366	1.74
22x50	S27		1000	0.249	2.20	820	0.303	2.00	—	—	—
25x25	S32		470	0.529	1.55	390	0.638	1.35	390	0.638	1.35
25x30	S33		680	0.366	1.70	560	0.444	1.53	560	0.444	1.53
25x35	S34		820	0.303	2.00	680	0.366	1.74	680	0.366	1.74
25x40	S35		1000	0.249	2.20	820	0.303	2.00	—	—	—
25x45	S36		1200	0.207	2.45	1000	0.249	2.23	820	0.303	2.04
25x50	S37		—	—	—	1200	0.207	2.51	1000	0.249	2.30
30x25	S42		680	0.366	1.82	560	0.444	1.67	560	0.444	1.67
30x30	S43		1000	0.249	2.20	820	0.303	2.00	820	0.303	2.00
30x35	S44		1200	0.207	2.44	1000	0.249	2.24	1000	0.249	2.24
30x40	S45		1500	0.166	2.82	1200	0.207	2.52	1200	0.207	2.52
30x45	S46		1800	0.138	3.31	1500	0.166	2.89	—	—	—
30x50	S47		—	—	—	—	—	—	1500	0.166	3.03
35x25	S52		1000	0.249	2.20	820	0.303	2.00	820	0.303	2.00
35x30	S53		1500	0.166	2.50	1200	0.207	2.50	1000	0.249	2.30
35x35	S54		1800	0.138	2.92	1500	0.166	2.89	1200	0.207	2.65
35x40	S55		—	—	—	1800	0.138	3.05	1500	0.166	3.08
35x45	S56		2200	0.113	3.48	—	—	—	1800	0.138	3.47
35x50	S57		2700	0.092	3.97	2200	0.113	3.60	2200	0.113	3.78

Large Capacitance Aluminum Electrolytic Capacitors

Rated voltage(V)		250			315			400			
Case ø DxDL(mm)	Casing symbol	Item	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current
			μF	Ω	Arms	μF	Ω	Arms	μF	Ω	Arms
22x25	S22		220	1.131	1.00	120	2.765	0.75	82	4.046	0.64
22x30	S23		270	0.922	1.14	150	2.212	0.82	100	3.317	0.69
22x35	S24		330	0.754	1.26	180	1.843	0.91	120	2.765	0.75
22x40	S25		390	0.638	1.49	220	1.508	1.02	150	2.212	0.82
22x45	S26		470	0.529	1.57	270	1.229	1.16	180	1.843	0.90
22x50	S27		560	0.444	1.67	330	1.005	1.20	220	1.508	1.05
25x25	S32		270	0.922	1.18	180	1.843	0.90	120	2.765	0.75
25x30	S33		330	0.754	1.30	220	1.508	1.00	150	2.212	0.84
25x35	S34		470	0.529	1.57	270	1.229	1.10	180	1.843	0.94
25x40	S35		560	0.444	1.79	330	1.005	1.20	220	1.508	1.07
25x45	S36		—	—	—	390	0.851	1.30	270	1.229	1.20
25x50	S37		680	0.366	1.84	470	0.706	1.40	330	1.005	1.32
30x25	S42		390	0.638	1.31	270	1.229	1.10	150	2.212	0.82
30x30	S43		560	0.444	1.79	330	1.005	1.20	220	1.508	1.06
30x35	S44		680	0.366	2.00	390	0.851	1.30	270	1.229	1.21
30x40	S45		820	0.303	2.16	470	0.706	1.40	330	1.005	1.39
30x45	S46		—	—	—	560	0.592	1.50	390	0.851	1.55
30x50	S47		1000	0.249	2.47	680	0.488	1.70	470	0.706	1.69
35x25	S52		560	0.444	1.68	330	1.005	1.20	220	1.508	1.08
35x30	S53		680	0.366	1.75	470	0.706	1.40	330	1.005	1.20
35x35	S54		820	0.303	2.00	560	0.592	1.50	390	0.851	1.54
35x40	S55		1000	0.249	2.30	680	0.488	1.70	470	0.706	1.74
35x45	S56		1200	0.207	2.43	820	0.405	2.00	560	0.592	1.85
35x50	S57		1500	0.166	2.96	—	—	—	—	—	—

(Note) ESR : 20°C, 120Hz ; Rated ripple current : 105°C, 120Hz

\* There are overseas factory product only on this page.

High-Reliability, Durable against Overvoltage

GREEN CAP 105°C 2000hours

- High-Reliability, no short-circuiting under overvoltage (abnormal voltage) application.
- Guarantees 2000 hours at 105°C.

Durable against overvoltage



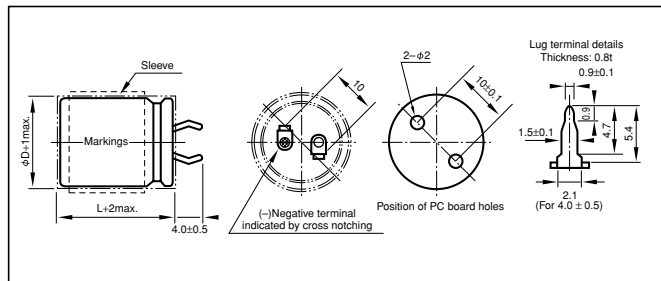
Marking color : White print on a black sleeve

Specifications

Item	Performance			
Category temperature range (°C)	-25 to +105			
Rated voltage(V)	200, 400			
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)			
Leakage current (µA)	Less than 0.02CV or 3mA whichever is smaller(after 5 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)			
Tangent of loss angle (tanδ)	0.15 or less (20°C, 120Hz)			
Overvoltage characteristics	The pressure valve shall operate normally free from shorts and sparks under the following test conditions.			
	Rated Voltage	Capacitance	Limited DC current	
	200V	C < 330µF	4A	300/375V(DC)
		330µF ≤ C < 470µF	5A	
400V	470µF ≤ C	7A	500/600V(DC)	
	C < 100µF	2A		
	100µF ≤ C < 220µF	4A		
	220µF ≤ C	7A		
Characteristics at high and low temperature	Impedance ratio (max.)	Z-25°C / Z+20°C	4 (120Hz)	
Endurance (105°C) (Applied ripple current)	Test time	2000 hours		
	Leakage current	The initial specified value or less		
	Percentage of capacitance change	Within ±20% of initial value		
	Tangent of the loss angle	200% or less of the initial specified value		
Shelf life (105°C)	Test time	1000 hours		
	Leakage current	The initial specified value or less		
	Percentage of capacitance change	Within ±15% of initial value		
	Tangent of the loss angle	150% or less of the initial specified value		
Applicable standards	Voltage application treatment JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)			

Large Capacitance Aluminum Electrolytic Capacitors

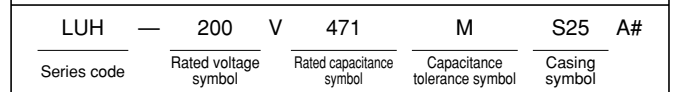
Outline Drawing



Coefficient of Frequency for Rated Ripple Current

Frequency(Hz)	50	120	1k	10k	30k
Correction coefficient	0.80	1	1.14	1.19	1.20

Part numbering system (example: 200V470µF)



Casing symbol

φ	L	25	30	35	40	45	50
20		S22	S23	S24	S25	S26	S27
25		S32	S33	S34	S35	S36	S37
30		S42	S43	S44	S45	S46	S47
35		S52	S53	S54	S55	S56	S57

Standard Ratings

Rated capacitance (µF)	Item	200								400							
		22		25		30		35		22		25		30		35	
		Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
68										22x25	0.51						
85										22x30	0.58	25x25	0.65				
100										22x35	0.70	25x25	0.68				
120										22x40	0.76	25x30	0.74	30x25	0.78		
150										22x45	0.86	25x35	0.85	30x25	0.85		
180										22x50	0.95	25x40	0.95	30x30	0.94	35x25	0.95
220		22x25	0.97									25x45	1.24	30x35	1.18	35x30	1.22
270		22x25	1.08									25x50	1.30	30x40	1.30	35x35	1.30
330		22x30	1.23	25x25	1.23									30x45	1.47	35x35	1.36
390		22x35	1.37	25x30	1.35									30x50	1.59	35x40	1.58
470		22x40	1.46	25x30	1.45	30x25	1.45									35x45	1.87
560		22x45	1.70	25x35	1.65	30x30	1.70										
680		22x50	1.84	25x40	1.80	30x35	1.88	35x25	1.81								
820				25x50	2.07	30x35	2.00	35x30	2.07								
1000						30x45	2.25	35x35	2.22								
1200						30x50	2.59	35x40	2.58								
1500								35x45	3.02								

(Note) Rated ripple current : 105°C, 120Hz.

\* There are overseas factory product only on this page.

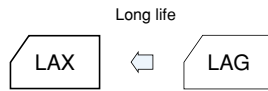
NOTE

Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.

## Miniaturized, Long Life, High-Reliability Capacitors

GREEN CAP 105°C 5000hours

- Long Life, high-reliability capacitors.
- Guarantees 5000 hours at 105°C.



Marking color : White print on a black sleeve

### Specifications

Item	Performance	
Category temperature range (°C)	-25 to +105	
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)	
Leakage current (µA)	Less than 0.02CV or 3mA whichever is smaller(after 5 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)	
Tangent of loss angle (tanδ)	Rated voltage (V)	160      200      250      400
	tanδ (max.)	0.215      0.15      0.15      0.20
Characteristics at high and low temperature	Percentage of capacitance change (%)	-25°C      Within ±30% of the value at 20°C
	Impedance ratio (max.)	Z-25°C / Z+20°C      4
Endurance (105°C) (Applied ripple current)	Test time	5000 hours
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±20% of initial value
	Tangent of the loss angle	200% or less of the initial specified value
Shelf life (105°C)	Test time	1000 hours
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±15% of initial value
	Tangent of the loss angle	150% or less of the initial specified value
Applicable standards	Voltage application treatment JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)	

Large Capacitance Aluminum Electrolytic Capacitors

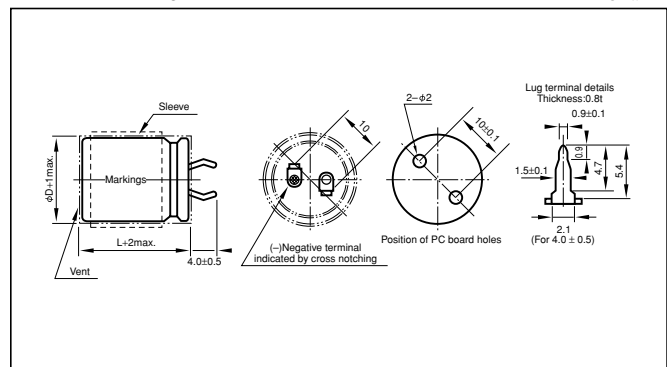
### Standard Ratings

Case φ DxL (mm)	Item	160		200		250		400	
		Rated capacitance µF	Rated ripple current Arms	Rated capacitance µF	Rated ripple current Arms	Rated capacitance µF	Rated ripple current Arms	Rated capacitance µF	Rated ripple current Arms
22x25	S22	270	0.91	180	0.75	150	0.68	56	0.34
22x30	S23	330	1.09	270	0.99	180	0.81	68	0.40
22x35	S24	390	1.27	330	1.16	220	0.95	82	0.47
22x40	S25	470	1.36	390	1.24	270	1.03	120	0.56
22x50	S27	680	1.52	470	1.37	390	1.16	150	0.63
25x25	S32	390	1.15	270	0.96	180	0.78	68	0.39
25x30	S33	470	1.36	330	1.14	270	1.03	100	0.51
25x35	S34	560	1.54	470	1.45	330	1.21	120	0.60
25x40	S35	680	1.68	560	1.55	390	1.29	150	0.66
25x50	S37	820	1.81	680	1.72	470	1.43	220	0.80
30x25	S42	560	1.45	330	1.11	270	1.01	100	0.50
30x30	S43	680	1.68	470	1.43	330	1.16	150	0.66
30x35	S44	820	1.82	560	1.66	470	1.33	180	0.77
30x40	S45	1000	1.90	680	1.79	560	1.48	220	0.83
30x50	S47	1200	2.09	1000	2.00	680	1.59	270	0.92
35x30	S53	820	1.93	680	1.76	470	1.33	180	0.74
35x35	S54	1000	2.15	820	2.05	560	1.55	220	0.87
35x40	S55	1500	2.52	1000	2.22	680	1.69	270	0.94
35x50	S57	1800	2.63	1200	2.43	1000	2.22	330	1.04

(Note) Rated ripple current : 105°C, 120Hz.

### Outline Drawing

Unit: mm



### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)				
	50	120	1k	10k	30k
160 to 250	0.87	1	1.11	1.18	1.20
400	0.80	1	1.14	1.19	1.20

### Part numbering system (example: 200V470µF)

LAX	—	200	V	471	M	S34	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

• The electric characteristics are described on page 121.

\* There are overseas factory product only on this page.

## Aluminum Electrolytic Capacitors for Audio

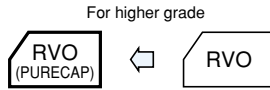
## Chip Type Audio Use Capacitors

GREEN CAP

SMD

For audio

- Audio grade surface mount product with completely new components using synthetic mica paper for the separator.
- Both quality sense and sound field that could not be realized by the surface mount products are reproducible.



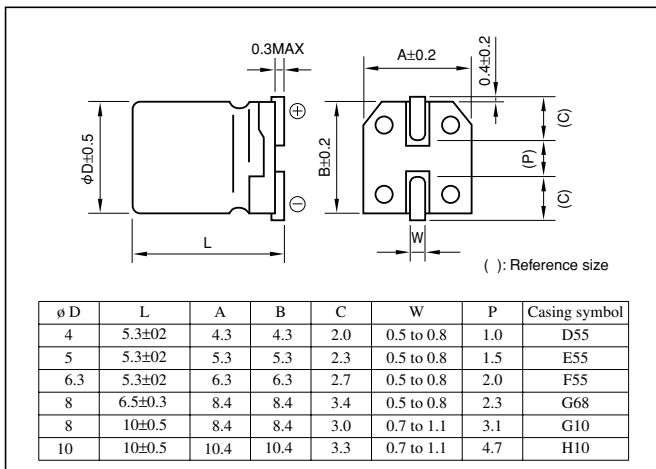
Marking color : Black print (except height : 10mm)  
White print on a brown sleeve (ø8x10L, ø10x10L)

### Specifications

Item	Performance							
Category temperature range (°C)	-40 to +85							
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)							
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)							
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	
	tanδ (max.)	0.28	0.24	0.20	0.14	0.12	0.10	
Characteristics at high and low temperature	Impedance ratio (max.)	Z-25°C / Z+20°C	3	3	2	2	2	
		Z-40°C / Z+20°C	8	5	4	3	3	
Endurance (85°C) (Applied ripple current)	Test time	2000 hours						
	Leakage current	The initial specified value or less						
	Percentage of capacitance change	Within ±20% of initial value						
	Tangent of the loss angle	200% or less of the initial specified value						
Shelf life (85°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment							
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)							

### Outline Drawing

Unit: mm



### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50	120	1k	10k · 100k
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50	0.80	1	1.35	1.50

### Part numbering system (example: 16V470µF)

RVO	—	16	V	471	M	H10	□	U	□
Series code	Rated voltage symbol	Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol	Taping symbol			

- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

### Standard Ratings

Rated capacitance(µF)	6.3		10		16		25		35		50		
	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	
	ø DxL(mm)	mArms	ø DxL(mm)	mArms	ø DxL(mm)	mArms	ø DxL(mm)	mArms	ø DxL(mm)	mArms	ø DxL(mm)	mArms	
0.1	—	—	—	—	—	—	—	—	—	—	4x5.3	3	
0.22	—	—	—	—	—	—	—	—	—	—	4x5.3	5	
0.33	—	—	—	—	—	—	—	—	—	—	4x5.3	6	
0.47	—	—	—	—	—	—	—	—	—	—	4x5.3	7	
1	—	—	—	—	—	—	—	—	—	—	4x5.3	10	
2.2	—	—	—	—	—	—	—	—	—	—	4x5.3	15	
3.3	—	—	—	—	—	—	—	—	4x5.3	17	4x5.3	19	
4.7	—	—	—	—	—	4x5.3	18	4x5.3	19	4x5.3	20	5x5.3	26
10	—	—	4x5.3	23	4x5.3	26	5x5.3	32	5x5.3	34	6.3x5.3	44	
22	4x5.3	31	5x5.3	40	5x5.3	44	6.3x5.3	55	6.3x5.3	59	8x6.5	124	
33	5x5.3	44	5x5.3	49	6.3x5.3	63	6.3x5.3	67	8x6.5	124	8x6.5	124	
47	5x5.3	53	6.3x5.3	68	6.3x5.3	76	8x6.5	124	8x6.5	124	8x10	200	
100	6.3x5.3	90	6.3x5.3	99	8x6.5	124	8x6.5	137	8x10	200	10x10	366	
220	8x6.5	149	8x6.5	149	8x10	200	8x10	235	10x10	366	—	—	
330	8x6.5	160	8x10	226	8x10	245	10x10	366	—	—	—	—	
470	8x10	251	10x10	366	10x10	366	—	—	—	—	—	—	
1000	10x10	423	—	—	—	—	—	—	—	—	—	—	

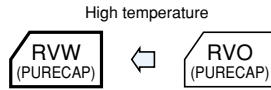
(Note) Rated ripple current : 85°C, 120Hz.



Chip Type Audio Use Capacitors

GREEN CAP SMD For audio 105°C 1000hours

- Audio grade surface mount product with completely new components using synthetic mica paper for the separator.
- Both quality sense and sound field that could not be realized by the surface mount products are reproducible.



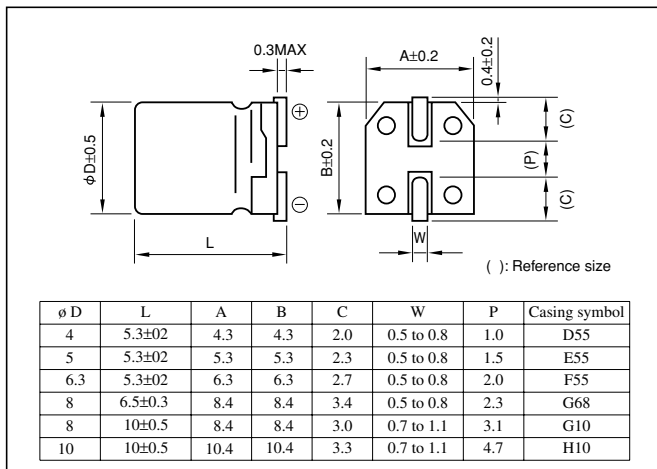
Marking color : Black print (except height : 10mm)  
White print on a brown sleeve (ø8x10L, ø10x10L)

Specifications

Item	Performance						
Category temperature range (°C)	-55 to +105						
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)						
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger(after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)						
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50
	tanδ (max.)	0.30	0.26	0.22	0.16	0.13	0.12
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2
Endurance (105°C) (Applied ripple current)	Test time	1000 hours					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±20% of initial value					
	Tangent of the loss angle	200% or less of the initial specified value					
Shelf life (105°C)	Test time : 1000 hours; other items are the same as those for the endurance. Voltage application treatment						
Applicable standards	JIS C5101-1, -18 1998 (IEC 60384-1 1992, -18 1993)						

Outline Drawing

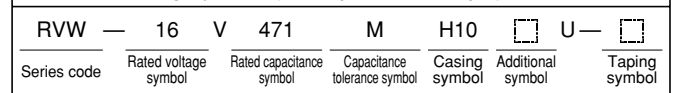
Unit: mm



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50	120	1k	10k · 100k
6.3 to 16	0.80	1	1.15	1.25
25 to 35	0.80	1	1.25	1.40
50	0.80	1	1.35	1.50

Part numbering system (example: 16V470µF)



- Land pattern size is described on page 10.
- The taping specifications are described on page 11.
- Soldering conditions are described on page 32.

Standard Ratings

Rated capacitance(µF)	Item	6.3		10		16		25		35		50	
		Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
		φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms
0.1	—	—	—	—	—	—	—	—	—	—	—	4x5.3	2
0.22	—	—	—	—	—	—	—	—	—	—	—	4x5.3	3
0.33	—	—	—	—	—	—	—	—	—	—	—	4x5.3	4
0.47	—	—	—	—	—	—	—	—	—	—	—	4x5.3	5
1	—	—	—	—	—	—	—	—	—	—	—	4x5.3	7
2.2	—	—	—	—	—	—	—	—	—	—	—	4x5.3	10
3.3	—	—	—	—	—	—	—	—	—	—	—	4x5.3	12
4.7	—	—	—	—	—	—	—	4x5.3	12	4x5.3	14	5x5.3	17
10	—	—	4x5.3	15	4x5.3	16	5x5.3	21	5x5.3	23	6.3x5.3	26	
22	4x5.3	21	5x5.3	25	5x5.3	28	6.3x5.3	36	6.3x5.3	50	8x6.5	110	
33	5x5.3	30	5x5.3	31	6.3x5.3	40	6.3x5.3	44	8x6.5	110	8x10	178	
47	5x5.3	36	6.3x5.3	43	6.3x5.3	47	8x6.5	110	8x10	178	8x10	178	
100	6.3x5.3	61	8x6.5	110	8x10	178	8x10	178	10x10	324	10x10	324	
220	8x10	178	8x10	178	10x10	324	10x10	324	10x10	324	—	—	
330	8x10	178	10x10	324	10x10	324	—	—	—	—	—	—	
470	10x10	324	10x10	324	10x10	324	—	—	—	—	—	—	

(Note) Rated ripple current : 105°C, 120Hz.

### ■ SILMIC series Silk fiber using audio purpose capacitor

- ELNA developed new raw material for the separate paper which use a silk fibers. Therefore, this capacitor can give you high grade sound for your audio design.
- Due to the silk fiber's pliability, the capacitor makes a dream of the high quality sound.

For examples;

- To relieve the music's vibration energy.
- To decrease the peak feeling sound at high compass and rough quality sound at middle compass.
- To increase massive sound at low compass.
- For bipolar capacitors, consult with us.



### Miniature High Grade Capacitors for Audio(SILMIC II)

GREEN CAP

For audio

- All lead wires oxygen-free copper for extremely low distortion. (Third high frequency distortion 10kHz,0.1A,-120dB or less)
- "SILMIC II" mark on sleeve.

For higher grade    For higher grade    For higher grade

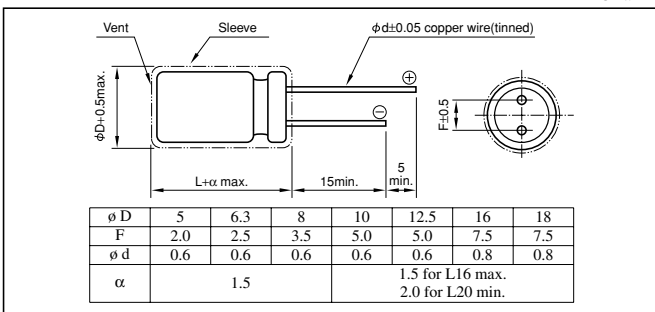


### Specifications

Item	Performance									
Category temperature range (°C)	-40 to +85									
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)									
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger (after 5 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)									
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	63	100	
	tanδ (max.)	0.20	0.17	0.13	0.10	0.10	0.08	0.08	0.08	
0.02 is added to every 1000µF increase over 1000µF (20°C,120Hz)										
Endurance (85°C) (Applied ripple current)	Test time	1000 hours (with the polarity inverted every 250 hours)								
	Leakage current	The initial specified value or less								
	Percentage of capacitance change	Within ±20% of initial value								
	Tangent of the loss angle	150% or less of the initial specified value								
Shelf life (85°C)	Test time : 1000 hours. Other have same as endurance. Voltage application treatment									
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)									

### Outline Drawing

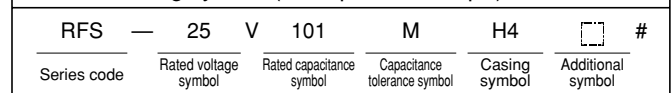
Unit: mm



### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz) CV(µFxWV)	Frequency(Hz)				
		50 · 60	120	1k	10k	100k
6.3 to 16	All CV value	0.8	1	1.1	1.2	1.2
	≤ 1000	0.8	1	1.5	1.7	1.7
25 to 35	1000 <	0.8	1	1.2	1.3	1.3
	≤ 1000	0.8	1	1.6	1.9	1.9
50 to 100	1000 <	0.8	1	1.2	1.3	1.3

### Part numbering system (example: 25V100µF)



### Case symbol

Case φ DxL(mm)	Casing Symbol	Case φ DxL(mm)	Casing Symbol	Case φ DxL(mm)	Casing Symbol	Case φ DxL(mm)	Casing Symbol
5x11	E3	10x12.5	H3	12.5x20	I5	16x31.5	J7
6.3x11	E3	10x16	H4	12.5x25	I6	16x35.5	J8
8x11.5	G3	10x20	H5	16x25	J6	18x35.5	K8
				18x40			K9

### Standard Ratings

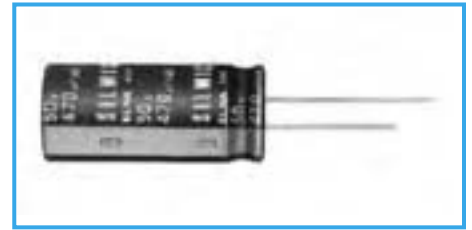
Rated capacitance(µF)	6.3		10		16		25		35		50		63		100	
	Case φ DxL(mm)	Rated ripple current mA	Case φ DxL(mm)	Rated ripple current mA	Case φ DxL(mm)	Rated ripple current mA	Case φ DxL(mm)	Rated ripple current mA	Case φ DxL(mm)	Rated ripple current mA	Case φ DxL(mm)	Rated ripple current mA	Case φ DxL(mm)	Rated ripple current mA	Case φ DxL(mm)	Rated ripple current mA
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	10
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	20	25
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	30	40
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	5x11	40	60
10	—	—	—	—	5x11	35	5x11	25	5x11	30	—	—	—	5x11	20	25
22	—	—	5x11	50	5x11	55	5x11	60	5x11	60	—	—	—	5x11	25	30
33	—	—	5x11	65	5x11	70	5x11	70	5x11	70	—	—	—	5x11	30	40
47	—	—	5x11	75	5x11	85	5x11	85	5x11	85	—	—	—	5x11	35	40
100	—	—	5x11	90	5x11	90	5x11	90	5x11	90	—	—	—	5x11	40	60
220	—	—	5x11	100	5x11	100	5x11	100	5x11	100	—	—	—	5x11	40	60
330	—	—	5x11	110	5x11	110	5x11	110	5x11	110	—	—	—	5x11	40	60
470	—	—	5x11	120	5x11	120	5x11	120	5x11	120	—	—	—	5x11	40	60
1000	—	—	5x11	130	5x11	130	5x11	130	5x11	130	—	—	—	5x11	40	60
2200	—	—	5x11	140	5x11	140	5x11	140	5x11	140	—	—	—	5x11	40	60
3300	—	—	5x11	150	5x11	150	5x11	150	5x11	150	—	—	—	5x11	40	60

(Note) Rated ripple current : 85°C, 120Hz

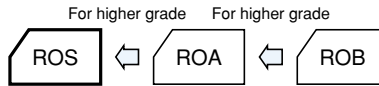
■ SILMIC series Silk fiber using audio purpose capacitor

High Grade Capacitors for Audio(SILMIC)

GREEN CAP For audio



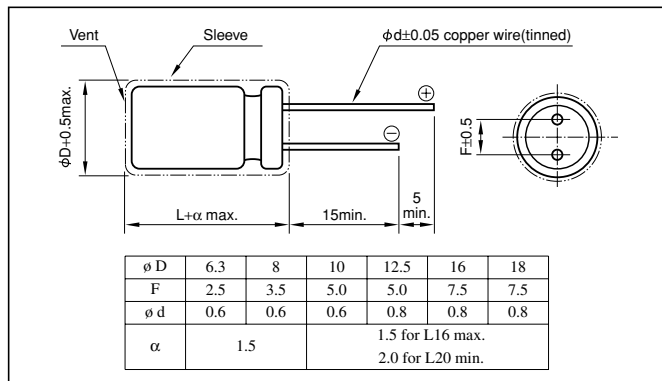
- All lead wires oxygen-free copper for extremely low distortion. (Third high frequency distortion 10kHz,0.1A,-120dB or less)
- "SILMIC" mark on sleeve.



Specifications

Item	Performance						
Category temperature range (°C)	-40 to +85						
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)						
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger (after 5 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)						
Tangent of loss angle (tanδ)	Rated voltage (V)	16	25	35	50	63	100
	tanδ (max.)	0.13	0.10	0.10	0.08	0.08	0.08
0.02 is added to every 1000µF increase over 1000µF (20°C,120Hz)							
Endurance (85°C) (Applied ripple current)	Test time	1000 hours					
	Leakage current	The initial specified value or less					
	Percentage of capacitance change	Within ±20% of initial value					
	Tangent of the loss angle	150% or less of the initial specified value					
Shelf life (85°C)	Test time : 1000 hours. Other have same as endurance. Voltage application treatment						
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)						

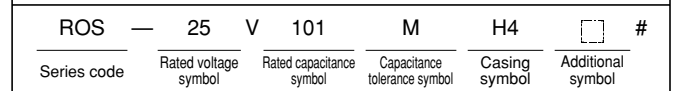
Outline Drawing



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz) CV(µFxVV)	50 · 60	120	1k	10k	100k
		All CV value	0.80	1	1.1	1.2
16	≤ 1000	0.80	1	1.5	1.7	1.7
	1000 <	0.80	1	1.2	1.3	1.3
25 to 35	≤ 1000	0.80	1	1.6	1.9	1.9
	1000 <	0.80	1	1.2	1.3	1.3

Part numbering system (example: 25V100µF)



Case symbol

Case φ DxL(mm)	Casing Symbol	Case φ DxL(mm)	Casing Symbol	Case φ DxL(mm)	Casing Symbol	Case φ DxL(mm)	Casing Symbol
5x11	E3	10x12.5	H3	12.5x20	J5	16x31.5	J7
6.3x11	F3	10x16	H4	12.5x25	J6	16x35.5	J8
8x11.5	G3	10x20	H5	16x25	J6	18x35.5	K8
						18x40	K9

Standard Ratings

Rated capacitance(µF)	Item	16		25		35		50		63		100	
		Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
		φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—
1	—	—	—	—	—	—	—	—	—	—	—	—	—
2.2	—	—	—	—	—	—	—	—	—	—	—	6.3x11	25
3.3	—	—	—	—	—	—	—	—	—	—	—	8x11.5	35
4.7	—	—	—	—	—	—	—	6.3x11	40	6.3x11	40	10x12.5	60
10	—	—	—	—	—	6.3x11	55	8x11.5	75	8x11.5	75	10x16	95
22	6.3x11	70	6.3x11	80	8x11.5	95	10x12.5	130	10x16	140	10x20	155	
33	6.3x11	90	8x11.5	120	10x12.5	140	10x16	175	10x20	190	12.5x20	220	
47	8x11.5	125	8x11.5	140	10x12.5	170	10x16	210	10x20	225	12.5x25	285	
100	10x12.5	215	10x16	270	10x20	295	12.5x20	380	12.5x25	415	16x25	485	
220	10x20	385	12.5x20	505	12.5x25	550	16x25	720	16x31.5	785	18x40	930	
330	12.5x20	545	12.5x25	675	16x25	785	16x31.5	965	16x35.5	1010	—	—	
470	12.5x25	710	16x25	940	16x31.5	1030	16x35.5	1210	18x35.5	1295	—	—	
1000	16x31.5	1315	16x35.5	1575	18x35.5	1690	18x40	1985	—	—	—	—	
2200	18x40	2150	—	—	—	—	—	—	—	—	—	—	

(Note) Rated ripple current : 85°C, 120Hz.

NOTE

Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.

## CERAFINE series Fine ceramic adopted electrolytic capacitor for audio

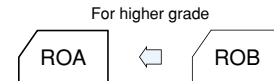
- This reproduces very clear sound with real concert-hall presence by depressing the generation of electrical noise due to external vibration.
- As the charging and discharging speed between the oxidized film of anode and field surface of electrolyte and the variation of potential due to unevenness of fibers of separating paper sheets are improved by the electro-chemical action of super fine particle ceramic, this product realize high grade audio tone with excellent sound resolution power, good rise in the low-pitched sound region and no distortion in the medium and high-pitched sound region.
- For bipolar capacitors, consult with us.



## Standard Capacitors for Audio(Cerafine)

GREEN CAP For audio

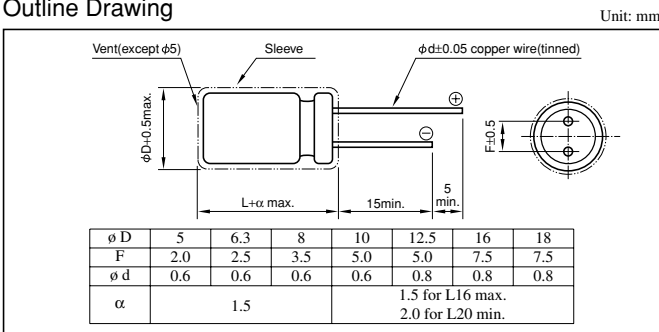
- All lead wires oxygen-free copper for extremely low distortion. (Third high frequency distortion 10kHz,0.1A,-120dB or less)
- Printed "Cerafine" mark.



### Specifications

Item	Performance								
Category temperature range (°C)	-40 to +85								
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)								
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger (after 5 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)								
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	63	100
	tanδ (max.)	0.23	0.20	0.16	0.16	0.14	0.12	0.12	0.12
0.02 is added to every 1000µF increase over 1000µF (20°C,120Hz)									
Endurance (85°C) (Applied ripple current)	Test time	1000 hours							
	Leakage current	The initial specified value or less							
	Percentage of capacitance change	Within ±20% of initial value							
	Tangent of the loss angle	150% or less of the initial specified value							
Shelf life (85°C)	Test time : 1000 hours. Other have same as endurance. Voltage application treatment								
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)								

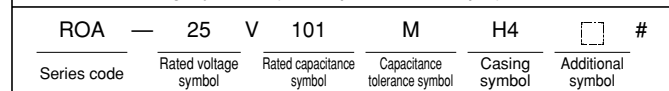
### Outline Drawing



### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz) CV(µFxWV)	50 · 60	120	1k	10k	100k
		6.3 to 16	All CV value	0.8	1	1.1
25 to 35	≤ 1000	0.8	1	1.5	1.7	1.7
	1000 <	0.8	1	1.2	1.3	1.3
50 to 100	≤ 1000	0.8	1	1.6	1.9	1.9
	1000 <	0.8	1	1.2	1.3	1.3

### Part numbering system (example: 25V100µF)



### Case symbol

Case	Casing Symbol	Case	Casing Symbol	Case	Casing Symbol	Case	Casing Symbol
φ DxL(mm)		φ DxL(mm)		φ DxL(mm)		φ DxL(mm)	
5x11	E3	10x12.5	H3	12.5x20	I5	16x31.5	J7
6.3x11	F3	10x16	H4	12.5x25	I6	16x35.5	J8
8x11.5	G3	10x20	H5	16x25	J6	18x35.5	K8
						18x40	K9

### Standard Ratings

Rated capacitance(µF)	6.3		10		16		25		35		50		63		100	
	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.7	—	—	—	—	—	—	5x11	25	5x11	25	6.3x11	35	6.3x11	35	8x11.5	40
10	—	—	—	—	5x11	35	5x11	35	6.3x11	45	6.3x11	50	8x11.5	60	10x12.5	70
22	—	—	5x11	50	6.3x11	65	6.3x11	65	8x11.5	80	10x12.5	105	10x12.5	105	10x20	125
33	5x11	55	6.3x11	70	6.3x11	80	8x11.5	95	10x12.5	120	10x12.5	130	10x16	140	12.5x20	175
47	6.3x11	80	6.3x11	85	8x11.5	110	8x11.5	110	10x12.5	140	10x16	170	10x20	185	12.5x25	230
100	8x11.5	135	8x11.5	145	10x12.5	195	10x16	215	10x20	250	12.5x20	310	12.5x20	310	16x25	395
220	10x12.5	240	10x12.5	260	10x16	320	10x20	350	12.5x25	465	16x25	585	16x31.5	640	18x40	760
330	10x12.5	290	10x16	350	10x20	425	12.5x20	490	16x25	665	16x31.5	785	16x35.5	825	—	—
470	10x16	390	10x20	455	12.5x20	585	12.5x25	640	16x25	795	16x35.5	985	18x35.5	1050	—	—
1000	12.5x20	710	12.5x25	835	16x25	1080	16x31.5	1180	18x35.5	1430	—	—	—	—	—	—
2200	16x25	1280	16x31.5	1500	18x35.5	1870	—	—	—	—	—	—	—	—	—	—
3300	16x31.5	1660	18x35.5	1980	—	—	—	—	—	—	—	—	—	—	—	—
4700	16x35.5	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6800	18x40	2550	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz

Miniature Standard Capacitors for Audio

GREEN CAP For audio



TONEREX

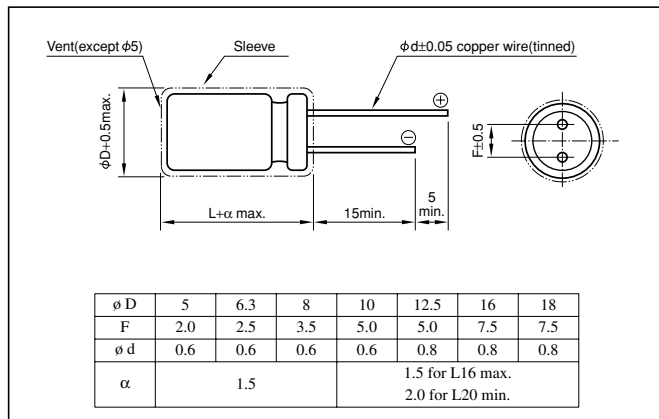
- Adopting the newly developed formation method and composite electrolytic paper for audio application has reduced distortion, achieving high-quality sound.
- All lead wires are oxygen-free copper wires to reduce distortion.

Specifications

Item	Performance									
Category temperature range (°C)	-40 to +85									
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)									
Leakage current (µA)	Less than 0.01CV or 4 whichever is larger (after 5 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)									
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	63	100	
	tanδ (max.)	0.24	0.20	0.16	0.14	0.12	0.10	0.09	0.08	
0.02 is added to every 1000µF increase over 1000µF (20°C, 120Hz)										
Endurance (85°C) (Applied ripple current)	Test time	1000 hours								
	Leakage current	The initial specified value or less								
	Percentage of capacitance change	Within ±20% of initial value								
	Tangent of the loss angle	150% or less of the initial specified value								
Shelf life (85°C)	Test time : 1000 hours. Other have same as endurance. Voltage application treatment									
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)									

Outline Drawing

Unit: mm



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz) CV(µFxWV)	50 · 60	120	1k	10k	100k
		6.3 to 16	All CV value	0.80	1	1.1
25 to 35	≤ 1000	0.80	1	1.5	1.7	1.7
	1000 <	0.80	1	1.2	1.3	1.3
50 to 100	≤ 1000	0.80	1	1.6	1.9	1.9
	1000 <	0.80	1	1.2	1.3	1.3

Part numbering system (example: 25V100µF)

ROB	—	25	V	101	M	G3	□	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol	

Case symbol

Case Symbol	Casing Symbol	Case Symbol	Casing Symbol	Case Symbol	Casing Symbol	Case Symbol	Casing Symbol
5x11	E3	10x12.5	H3	12.5x20	I5	16x31.5	J7
6.3x11	F3	10x16	H4	12.5x25	I6	16x35.5	J8
8x11.5	G3	10x20	H5	16x25	J6	18x35.5	K8
				18x40			K9

Standard Ratings

Rated capacitance(µF)	Item	6.3		10		16		25		35		50		63		100	
		Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
		φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms
0.47	—	—	—	—	—	—	—	—	—	—	—	5x11	5	—	—	5x11	10
1	—	—	—	—	—	—	—	—	—	—	—	5x11	10	—	—	5x11	15
2.2	—	—	—	—	—	—	—	—	—	—	—	5x11	20	—	—	5x11	25
3.3	—	—	—	—	—	—	—	—	—	—	—	5x11	25	—	—	5x11	30
4.7	—	—	—	—	—	—	—	5x11	25	—	—	5x11	35	5x11	35	6.3x11	40
10	—	—	—	—	5x11	35	5x11	40	5x11	45	5x11	50	6.3x11	60	8x11.5	70	
22	—	—	5x11	50	5x11	60	5x11	60	6.3x11	75	6.3x11	80	8x11.5	100	10x12.5	120	
33	5x11	55	5x11	65	5x11	70	6.3x11	80	6.3x11	90	8x11.5	110	8x11.5	115	10x16	160	
47	5x11	65	5x11	75	6.3x11	95	6.3x11	100	8x11.5	120	8x11.5	130	10x12.5	165	10x20	210	
100	6.3x11	110	6.3x11	120	8x11.5	150	8x11.5	165	10x12.5	210	10x16	250	10x20	285	12.5x20	340	
220	8x11.5	185	8x11.5	200	10x12.5	265	10x16	310	10x20	365	12.5x20	440	12.5x20	470	16x25	620	
330	10x12.5	265	10x12.5	200	10x16	350	10x20	410	12.5x20	500	12.5x20	540	12.5x25	620	16x31.5	820	
470	10x12.5	315	10x16	380	10x20	460	12.5x20	550	12.5x25	640	16x25	800	16x25	840	18x35.5	1000	
1000	10x20	550	12.5x20	670	12.5x25	810	16x25	1000	16x25	1050	16x31.5	1200	18x35.5	1500	—	—	
2200	12.5x25	980	16x25	1200	16x25	1350	16x35.5	1650	18x35.5	1900	—	—	—	—	—	—	
3300	16x25	1300	16x31.5	1600	16x35.5	1800	18x40	2100	—	—	—	—	—	—	—	—	
4700	16x31.5	1700	16x35.5	1900	18x35.5	2400	—	—	—	—	—	—	—	—	—	—	
6800	16x35.5	2100	18x40	2600	—	—	—	—	—	—	—	—	—	—	—	—	
10000	18x40	2800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

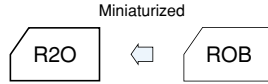
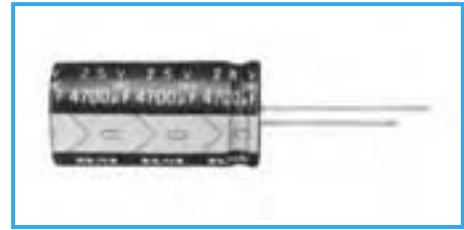
(Note) Rated ripple current : 85°C, 120Hz

### Miniature Standard Capacitors for Audio (PURECAP)

GREEN CAP

For audio

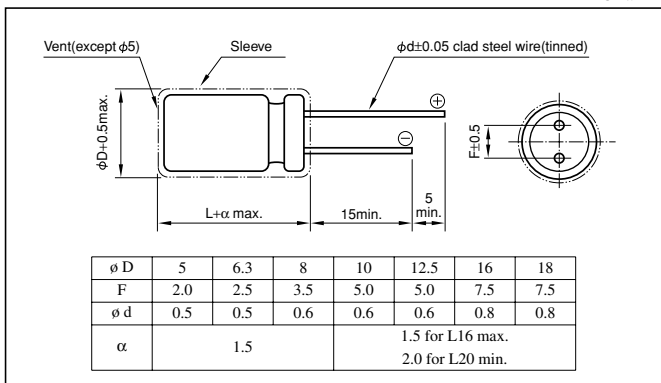
- A standard grade capacitor for excellent sound quality.
- A new foil and refined electrolyte allow improved tone quality.
- New type standard miniaturized capacitor for audio, using synthetic mica paper for the separator.



### Specifications

Item	Performance								
Category temperature range (°C)	-40 to +85								
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)								
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)								
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	63	100
	tanδ (max.)	0.30	0.25	0.19	0.16	0.14	0.12	0.10	0.10
0.02 is added to every 1000µF increase over 1000µF (20°C, 120Hz)									
Endurance (85°C) (Applied ripple current)	Test time	1000 hours							
	Leakage current	The initial specified value or less							
	Percentage of capacitance change	Within ±20% of initial value							
	Tangent of the loss angle	200% or less of the initial specified value							
Shelf life (85°C)	Test time : 500 hours. Other have same as endurance. Voltage application treatment								
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)								

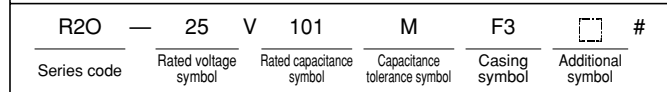
### Outline Drawing



### Coefficient of Frequency for Rated Ripple Current

Rated voltage (V)	Frequency (Hz)	CV(µFVW)					
		50 · 60	120	1k	10k	100k	
6.3 to 16	All CV value	0.80	1	1.1	1.2	1.2	
	≤ 1000	0.80	1	1.5	1.7	1.7	
25 to 35	1000 <	0.80	1	1.2	1.3	1.3	
	≤ 1000	0.80	1	1.6	1.9	1.9	
50 to 100	1000 <	0.80	1	1.2	1.3	1.3	
	≤ 1000	0.80	1	1.2	1.3	1.3	

### Part numbering system (example: 25V100µF)



### Case symbol

Case	Casing Symbol	Case	Casing Symbol	Case	Casing Symbol	Case	Casing Symbol
φ DxL(mm)		φ DxL(mm)		φ DxL(mm)		φ DxL(mm)	
5x11	E3	10x12.5	H3	12.5x20	I5	16x31.5	J7
6.3x11	F3	10x16	H4	12.5x25	I6	16x35.5	J8
8x11.5	G3	10x20	H5	16x25	J6	18x35.5	K8
				18x40			K9

### Standard Ratings

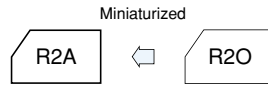
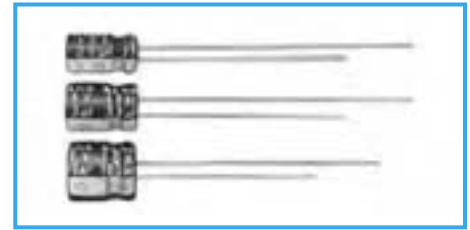
Rated capacitance(µF)	Item	6.3		10		16		25		35		50		63		100	
		Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
		φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms
0.47		—	—	—	—	—	—	—	—	—	—	5x11	9	—	—	5x11	10
1		—	—	—	—	—	—	—	—	—	—	5x11	14	—	—	5x11	15
2.2		—	—	—	—	—	—	—	—	—	—	5x11	20	—	—	5x11	20
3.3		—	—	—	—	—	—	—	—	—	—	5x11	25	—	—	5x11	25
4.7		—	—	—	—	—	—	—	—	5x11	25	5x11	30	5x11	30	5x11	30
10		—	—	—	—	—	—	—	—	5x11	40	5x11	40	5x11	45	6.3x11	55
22		—	—	—	—	5x11	50	5x11	55	5x11	60	5x11	65	6.3x11	80	8x11.5	95
33		—	—	5x11	55	5x11	60	5x11	70	5x11	75	6.3x11	90	6.3x11	100	10x12.5	140
47		—	—	5x11	65	5x11	75	5x11	80	6.3x11	100	6.3x11	110	8x11.5	140	10x16	180
100		5x11	85	5x11	95	6.3x11	120	6.3x11	140	8x11.5	170	8x11.5	190	10x12.5	250	12.5x20	340
220		6.3x11	150	6.3x11	165	8x11.5	220	8x11.5	240	10x12.5	310	10x16	370	10x20	440	16x25	640
330		6.3x11	180	8x11.5	240	8x11.5	270	10x12.5	350	10x16	420	10x20	490	12.5x20	620	16x25	780
470		8x11.5	260	8x11.5	280	10x12.5	390	10x16	460	10x20	540	12.5x20	670	12.5x25	810	16x31.5	1000
1000		10x12.5	450	10x16	540	10x20	680	12.5x20	850	12.5x25	540	16x25	1250	16x31.5	1500	—	—
2200		12.5x20	890	12.5x20	970	12.5x25	1200	16x25	1500	16x31.5	1750	16x35.5	2100	—	—	—	—
3300		12.5x20	1050	12.5x25	1250	16x25	1600	16x31.5	1900	18x35.5	2250	—	—	—	—	—	—
4700		16x25	1550	16x25	1650	16x31.5	2050	18x35.5	2450	—	—	—	—	—	—	—	—
6800		16x25	1750	16x31.5	2050	18x35.5	2550	—	—	—	—	—	—	—	—	—	—
10000		16x31.5	2150	18x35.5	2550	—	—	—	—	—	—	—	—	—	—	—	—
15000		18x35.5	2700	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz

For Audio, Ultra Miniaturized (PURECAP)

GREEN CAP For audio

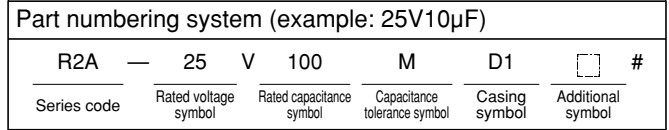
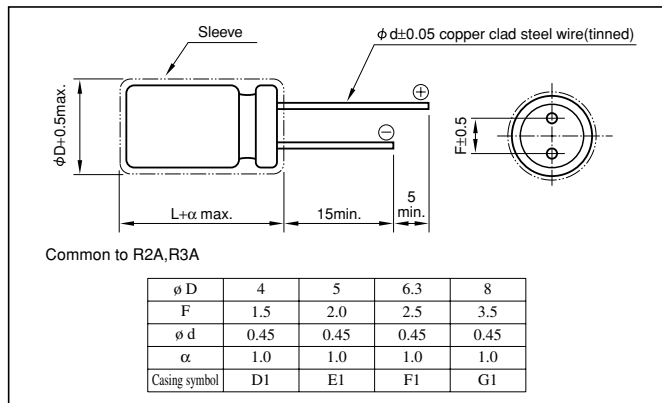
- A new foil and electrolyte makes powerful and clear sound.
- New type ultra miniaturized capacitor for audio, using synthetic mica paper for the separator.



Specifications

Item	Performance							
Category temperature range (°C)	-40 to +85							
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)							
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)							
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	
	tanδ (max.)	0.35	0.27	0.22	0.20	0.17	0.15	
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50	
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2	2
		Z-40°C / Z+20°C	10	8	6	4	4	4
Endurance (105°C) (Applied ripple current)	Test time	1000 hours						
	Leakage current	The initial specified value or less						
	Percentage of capacitance change	Within ±20% of initial value						
	Tangent of the loss angle	200% or less of the initial specified value						
Shelf life (105°C)	Test time : 500 hours; other items are the same as those for the endurance. Voltage application treatment							
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)							

Outline Drawing



Aluminum Electrolytic Capacitors for Audio

Standard Ratings

Rated voltage (V) \ Rated capacitance (µF)	6.3	10	16	25	35	50
0.1	—	—	—	—	—	4x7
0.22	—	—	—	—	—	4x7
0.33	—	—	—	—	—	4x7
0.47	—	—	—	—	—	4x7
1	—	—	—	—	—	4x7
2.2	—	—	—	—	—	4x7
3.3	—	—	—	—	—	4x7
4.7	—	—	—	→	4x7	5x7
10	—	—	→	4x7	5x7	6.3x7
22	→	4x7	→	5x7	→	6.3x7
33	→	4x7	→	5x7	6.3x7	8x7
47	→	5x7	→	6.3x7	8x7	—
100	→	5x7	6.3x7	6.3x7	8x7	—
220	→	6.3x7	8x7	—	—	—
330	→	8x7	—	—	—	—

(Note) "→" items are refer to the right.

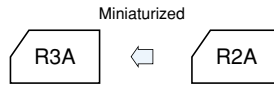
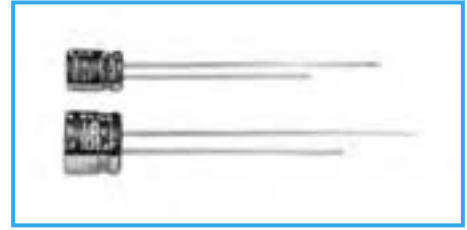


### For Audio, Ultra Miniaturized (PURECAP)

GREEN CAP

For audio

- A new foil and electrolyte makes powerful and clear sound.
- New type ultra miniaturized capacitor for audio, using synthetic mica paper for the separator.

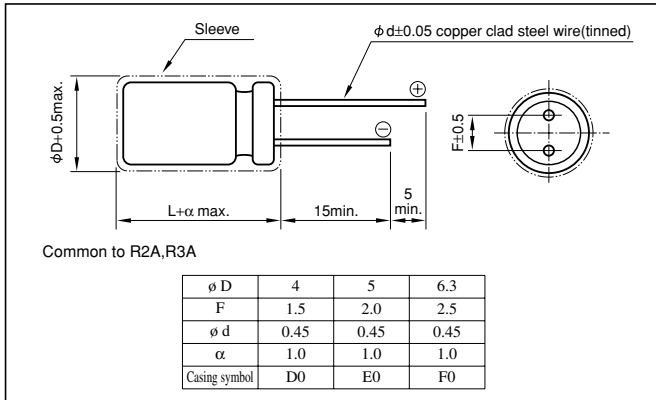


### Specifications

Item	Performance	
Category temperature range (°C)	-40 to +85	
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)	
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)	
Tangent of loss angle (tanδ)	Rated voltage (V)	4    6.3    10    16    25    35    50
	tanδ (max.)	0.46    0.30    0.26    0.20    0.17    0.13    0.11
Characteristics at high and low temperature	Rated voltage (V)	4    6.3    10    16    25    35    50
	Impedance ratio (max.)	Z-25°C / Z+20°C: 6    4    3    2    2    2    2 Z-40°C / Z+20°C: 16    10    8    6    4    4    4
Endurance (105°C) (Applied ripple current)	Test time	1000 hours
	Leakage current	The initial specified value or less
	Percentage of capacitance change	Within ±20% of initial value
	Tangent of the loss angle	200% or less of the initial specified value
Shelf life (105°C)	Test time : 500 hours; other items are the same as those for the endurance. Voltage application treatment	
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)	

### Outline Drawing

Unit: mm



### Part numbering system (example: 35V10µF)

R3A	—	35	V	100	M	E0	□	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol	

### Standard Ratings

Rated voltage (V) / Rated capacitance (µF)	4	6.3	10	16	25	35	50
0.1	—	—	—	—	—	—	4x5
0.22	—	—	—	—	—	—	4x5
0.33	—	—	—	—	—	—	4x5
0.47	—	—	—	—	—	—	4x5
1	—	—	—	—	—	—	4x5
2.2	—	—	—	—	—	—	4x5
3.3	—	—	—	—	—	—	4x5
4.7	—	—	—	—	—	4x5	5x5
10	—	—	→	4x5	→	5x5	6.3x5
22	—	4x5	→	5x5	→	6.3x5	—
33	4x5	→	5x5	→	6.3x5	—	—
47	4x5	5x5	→	6.3x5	—	—	—
100	5x5	→	6.3x5	—	—	—	—
220	6.3x5	—	—	—	—	—	—

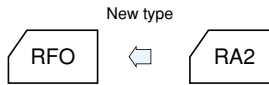
(Note) "→" items refer to the right.



Miniature Capacitors for Audio

GREEN CAP For audio

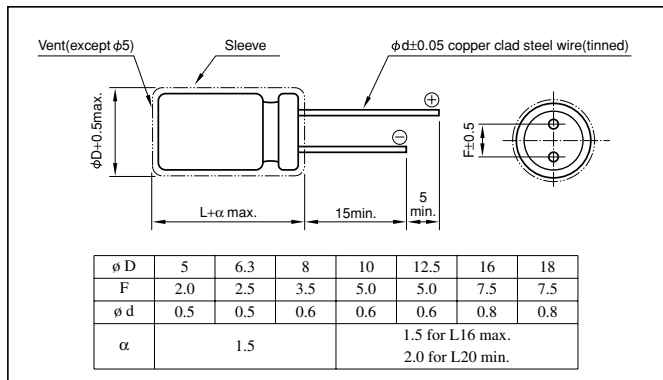
- A standard capacitor utilizing a newly developed material for a high grade of audio reproduction.
- Copper clad steel wire is used for leads.
- New type miniaturized capacitor for audio, using synthetic mica paper for the separator.



Specifications

Item	Performance									
Category temperature range (°C)	-40 to +85									
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)									
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)									
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	63	100	
	tanδ (max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08	
0.02 is added to every 1000µF increase over 1000µF (20°C, 120Hz)										
Endurance (85°C) (Applied ripple current)	Test time	1000 hours								
	Leakage current	The initial specified value or less								
	Percentage of capacitance change	Within ±20% of initial value								
	Tangent of the loss angle	150% or less of the initial specified value								
Shelf life (85°C)	Test time : 1000 hours. Other have same as endurance. Voltage application treatment									
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)									

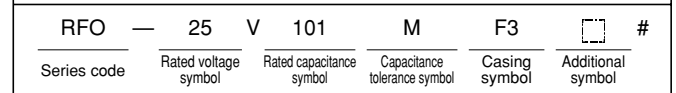
Outline Drawing



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz) CV(µFxV)	50 · 60	120	1k	10k	100k
		6.3 to 16	All CV value	0.80	1	1.1
25 to 35	≤ 1000	0.80	1	1.5	1.7	1.7
	1000 <	0.80	1	1.2	1.3	1.3
50 to 100	≤ 1000	0.80	1	1.6	1.9	1.9
	1000 <	0.80	1	1.2	1.3	1.3

Part numbering system (example: 25V100µF)



Case symbol

Case Symbol	Casing Symbol	Case Symbol	Casing Symbol	Case Symbol	Casing Symbol	Case Symbol	Casing Symbol
5x11	E3	10x12.5	H3	12.5x20	I5	16x31.5	J7
6.3x11	F3	10x16	H4	12.5x25	I6	16x35.5	J8
8x11.5	G3	10x20	H5	16x25	J6	18x35.5	K8
				18x40			K9

Standard Ratings

Rated capacitance(µF)	6.3		10		16		25		35		50		63		100	
	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
0.47	—	—	—	—	—	—	—	—	—	—	5x11	10	—	—	5x11	10
1	—	—	—	—	—	—	—	—	—	—	5x11	15	—	—	5x11	15
2.2	—	—	—	—	—	—	—	—	—	—	5x11	20	—	—	5x11	25
3.3	—	—	—	—	—	—	—	—	—	—	5x11	25	—	—	5x11	30
4.7	—	—	—	—	—	—	—	—	5x11	30	5x11	30	5x11	35	5x11	35
10	—	—	—	—	—	—	—	—	5x11	45	5x11	45	5x11	50	6.3x11	60
22	—	—	—	—	5x11	50	5x11	55	5x11	60	5x11	70	6.3x11	85	8x11.5	110
33	—	—	5x11	55	5x11	60	5x11	70	5x11	80	6.3x11	100	6.3x11	100	10x12.5	160
47	—	—	5x11	65	5x11	75	5x11	85	6.3x11	110	6.3x11	120	8x11.5	150	10x16	210
100	5x11	85	5x11	95	6.3x11	120	6.3x11	140	8x11.5	190	8x11.5	210	10x12.5	260	12.5x20	380
220	6.3x11	150	6.3x11	165	8x11.5	220	8x11.5	250	10x12.5	330	10x16	400	10x20	460	16x25	720
330	6.3x11	180	8x11.5	240	8x11.5	270	10x12.5	370	10x16	450	10x20	540	12.5x20	650	16x25	880
470	8x11.5	260	8x11.5	280	10x12.5	390	10x16	480	10x20	590	12.5x20	740	12.5x25	850	16x31.5	1150
1000	10x12.5	450	10x16	540	10x20	680	12.5x20	880	12.5x25	1050	16x25	1350	16x31.5	1550	—	—
2200	12.5x20	890	12.5x20	970	12.5x25	1200	16x25	1550	16x31.5	1750	16x35.5	2100	—	—	—	—
3300	12.5x20	1050	12.5x25	1250	16x25	1600	16x31.5	1950	18x35.5	2250	—	—	—	—	—	—
4700	16x25	1550	16x25	1650	16x31.5	2050	18x35.5	2500	—	—	—	—	—	—	—	—
6800	16x25	1750	16x31.5	2050	18x35.5	2550	—	—	—	—	—	—	—	—	—	—
10000	16x31.5	2150	18x35.5	2550	—	—	—	—	—	—	—	—	—	—	—	—
15000	18x35.5	2700	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz

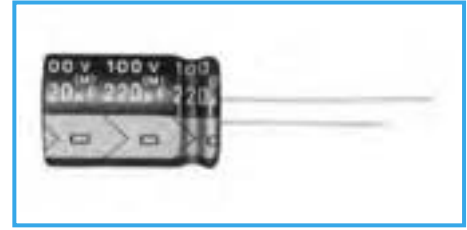
NOTE

Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.

### Miniature Capacitors for Audio

GREEN CAP For audio

- A standard capacitor utilizing a newly developed material for a high grade of audio reproduction.
- Copper clad steel wire is used for leads.

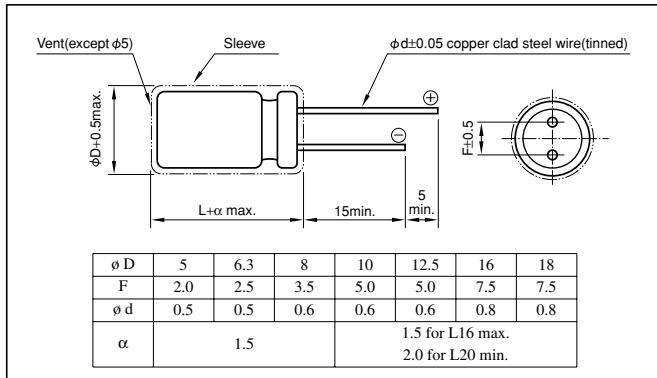


### Specifications

Item	Performance								
Category temperature range (°C)	-40 to +85								
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)								
Leakage current (µA)	Less than 0.01CV or 4 whichever is larger (after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)								
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	63	100
	tanδ (max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08
0.02 is added to every 1000µF increase over 1000µF (20°C, 120Hz)									
Endurance (85°C) (Applied ripple current)	Test time	1000 hours							
	Leakage current	The initial specified value or less							
	Percentage of capacitance change	Within ±20% of initial value							
	Tangent of the loss angle	150% or less of the initial specified value							
Shelf life (85°C)	Test time : 1000 hours. Other have same as endurance. Voltage application treatment								
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)								

### Outline Drawing

Unit: mm



### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz) CV(µFxWV)	50 - 60	120	1k	10k	100k
		6.3 to 16	All CV value	0.80	1	1.1
25 to 35	≤ 1000	0.80	1	1.5	1.7	1.7
	1000 <	0.80	1	1.2	1.3	1.3
50 to 100	≤ 1000	0.80	1	1.6	1.9	1.9
	1000 <	0.80	1	1.2	1.3	1.3

### Part numbering system (example: 25V100µF)

RA2	—	25	V	101	M	F3	□	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol	

### Case symbol

Case φ DxL(mm)	Casing Symbol	Case φ DxL(mm)	Casing Symbol	Case φ DxL(mm)	Casing Symbol	Case φ DxL(mm)	Casing Symbol
5x11	E3	10x12.5	H3	12.5x20	I5	16x31.5	J7
6.3x11	F3	10x16	H4	12.5x25	I6	16x35.5	J8
8x11.5	G3	10x20	H5	16x25	J6	18x35.5	K8
						18x40	K9

### Standard Ratings

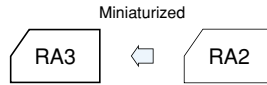
Rated capacitance(µF)	6.3		10		16		25		35		50		63		100		
	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	Case φ DxL(mm)	Rated ripple current mArms	
0.47	—	—	—	—	—	—	—	—	—	—	5x11	10	—	—	5x11	10	
1	—	—	—	—	—	—	—	—	—	—	5x11	15	—	—	5x11	15	
2.2	—	—	—	—	—	—	—	—	—	—	5x11	20	—	—	5x11	25	
3.3	—	—	—	—	—	—	—	—	—	—	5x11	25	—	—	5x11	30	
4.7	—	—	—	—	—	—	—	—	—	5x11	30	5x11	30	5x11	35	35	
10	—	—	—	—	—	—	—	—	—	5x11	45	5x11	45	5x11	50	6.3x11	60
22	—	—	—	—	—	5x11	50	5x11	55	5x11	60	5x11	70	6.3x11	85	8x11.5	110
33	—	—	5x11	55	5x11	60	5x11	70	5x11	80	6.3x11	100	6.3x11	100	10x12.5	160	
47	—	—	5x11	65	5x11	75	5x11	85	6.3x11	110	6.3x11	120	8x11.5	150	10x16	210	
100	5x11	85	5x11	95	6.3x11	120	6.3x11	140	8x11.5	190	8x11.5	210	10x12.5	260	12.5x20	380	
220	6.3x11	150	6.3x11	165	8x11.5	220	8x11.5	250	10x12.5	330	10x16	400	10x20	460	16x25	720	
330	6.3x11	180	8x11.5	240	8x11.5	270	10x12.5	370	10x16	450	10x20	540	12.5x20	650	16x25	880	
470	8x11.5	260	8x11.5	280	10x12.5	390	10x16	480	10x20	590	12.5x20	740	12.5x25	850	16x31.5	1150	
1000	10x12.5	450	10x16	540	10x20	680	12.5x20	880	12.5x25	1050	16x25	1350	16x31.5	1550	—	—	
2200	12.5x20	890	12.5x20	970	12.5x25	1200	16x25	1550	16x31.5	1750	16x35.5	2100	—	—	—	—	
3300	12.5x20	1050	12.5x25	1250	16x25	1600	16x31.5	1950	18x35.5	2250	—	—	—	—	—	—	
4700	16x25	1550	16x25	1650	16x31.5	2050	18x35.5	2500	—	—	—	—	—	—	—	—	
6800	16x25	1750	16x31.5	2050	18x35.5	2550	—	—	—	—	—	—	—	—	—	—	
10000	16x31.5	2150	18x35.5	2550	—	—	—	—	—	—	—	—	—	—	—	—	
15000	18x35.5	2700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

(Note) Rated ripple current : 85°C, 120Hz

Miniature Capacitors for Audio

GREEN CAP For audio

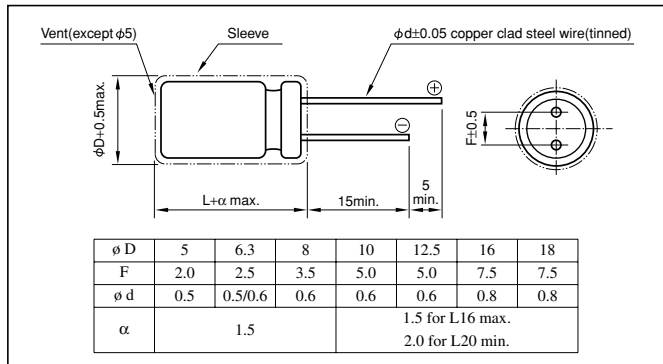
- With the same size as that for Series RE3 miniaturized standard capacitors, a high resolution sound quality grade has been realized.
- The newly developed audio use material makes clear sound a reality.
- All lead wires are copper clad steel.



Specifications

Item	Performance									
Category temperature range (°C)	-40 to +85									
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)									
Leakage current (µA)	Less than 0.01CV or 3 whichever is larger (after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)									
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	63	100	
	tanδ (max.)	0.28	0.24	0.20	0.16	0.14	0.12	0.11	0.10	
0.02 is added to every 1000µF increase over 1000µF (20°C, 120Hz)										
Endurance (85°C) (Applied ripple current)	Test time	2000 hours								
	Leakage current	The initial specified value or less								
	Percentage of capacitance change	Within ±20% of initial value								
	Tangent of the loss angle	200% or less of the initial specified value								
Shelf life (85°C)	Test time : 1000 hours. Other have same as endurance. Voltage application treatment									
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)									

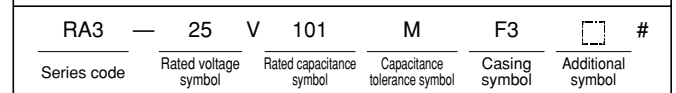
Outline Drawing



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz) CV(µFxV)	Frequency(Hz)				
		50 · 60	120	1k	10k	100k
6.3 to 16	All CV value	0.80	1	1.1	1.2	1.2
	≤ 1000	0.80	1	1.5	1.7	1.7
25 to 35	1000 <	0.80	1	1.2	1.3	1.3
	≤ 1000	0.80	1	1.6	1.9	1.9
50 to 100	1000 <	0.80	1	1.2	1.3	1.3
	≤ 1000	0.80	1	1.2	1.3	1.3

Part numbering system (example: 25V100µF)



Case symbol

Case	Casing Symbol	Case	Casing Symbol	Case	Casing Symbol	Case	Casing Symbol
φ DxL(mm)		φ DxL(mm)		φ DxL(mm)		φ DxL(mm)	
5x11	E3	10x12.5	H3	12.5x20	I5	16x31.5	J7
6.3x11	F3	10x16	H4	12.5x25	I6	18x35.5	K8
8x11.5	G3	10x20	H5	16x25	J6	—	—

Standard Ratings

Rated capacitance(µF)	Rated voltage(V)		6.3		10		16		25		35		50		63		100	
	Item	Case	Rated ripple current		Rated ripple current		Rated ripple current		Rated ripple current		Rated ripple current		Rated ripple current		Rated ripple current		Rated ripple current	
			φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms
0.1	—	—	—	—	—	—	—	—	—	—	—	—	5x11	3	—	—	—	—
0.22	—	—	—	—	—	—	—	—	—	—	—	—	5x11	6	—	—	—	—
0.33	—	—	—	—	—	—	—	—	—	—	—	—	5x11	9	—	—	—	—
0.47	—	—	—	—	—	—	—	—	—	—	—	—	5x11	13	—	—	5x11	13
1	—	—	—	—	—	—	—	—	—	—	—	—	5x11	21	—	—	5x11	21
2.2	—	—	—	—	—	—	—	—	—	—	—	—	5x11	31	—	—	5x11	31
3.3	—	—	—	—	—	—	—	—	—	—	—	—	5x11	38	—	—	5x11	40
4.7	—	—	—	—	—	—	—	—	—	—	—	—	5x11	45	—	—	5x11	50
10	—	—	—	—	—	5x11	50	5x11	55	5x11	60	5x11	66	5x11	70	5x11	70	70
22	—	—	—	—	—	5x11	75	5x11	90	5x11	95	5x11	100	5x11	105	6.3x11	115	115
33	—	—	—	—	—	5x11	110	5x11	110	5x11	110	5x11	110	5x11	110	6.3x11	130	158
47	—	—	—	—	—	5x11	130	5x11	130	5x11	130	5x11	130	5x11	130	6.3x11	155	188
100	—	5x11	130	5x11	150	5x11	180	6.3x11	199	6.3x11	214	6.3x11	214	8x11.5	250	8x11.5	270	358
220	—	5x11	240	6.3x11	250	6.3x11	280	8x11.5	349	8x11.5	350	10x12.5	429	10x16	505	12.5x20	663	663
330	—	6.3x11	300	6.3x11	330	8x11.5	383	8x11.5	383	10x12.5	542	10x16	595	10x20	676	12.5x25	886	886
470	—	6.3x11	380	8x11.5	417	8x11.5	480	10x12.5	545	10x16	664	12.5x20	887	12.5x20	924	16x25	1230	1230
1000	—	8x11.5	580	10x12.5	650	10x16	791	10x20	996	12.5x20	1210	12.5x25	1400	16x25	1710	18x35.5	2210	2210
2200	—	10x16	939	10x20	1080	12.5x20	1350	12.5x25	1660	16x25	1950	16x31.5	2340	18x35.5	2870	—	—	—
3300	—	16x20	1230	12.5x20	1430	12.5x25	1690	16x25	2030	16x31.5	2320	18x35.5	2810	—	—	—	—	—
4700	—	12.5x20	1710	12.5x25	1780	16x25	2100	16x31.5	2650	18x35.5	2290	—	—	—	—	—	—	—
6800	—	12.5x25	1930	16x25	2270	16x31.5	2480	18x35.5	3290	—	—	—	—	—	—	—	—	—
10000	—	16x25	2450	16x31.5	2500	18x35.5	3130	—	—	—	—	—	—	—	—	—	—	—
15000	—	16x31.5	2580	18x35.5	3100	—	—	—	—	—	—	—	—	—	—	—	—	—
22000	—	18x35.5	3150	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz

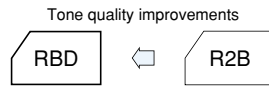
NOTE

Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.

### Miniature Bipolar Capacitors for Audio

GREEN CAP For audio

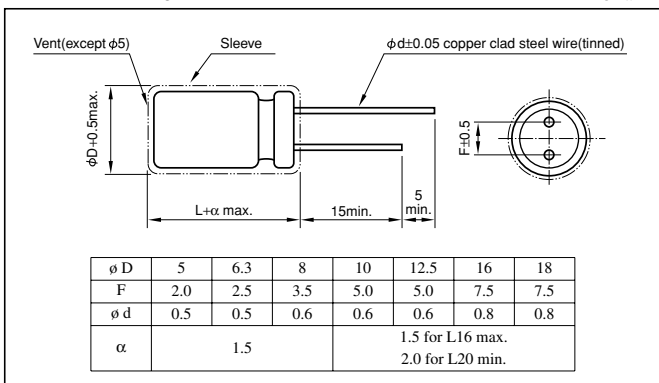
- The newly developed audio use foil and special electrolyte makes clear and far-carrying sound a reality.
- All lead wires are copper clad steel.



### Specifications

Item	Performance								
Category temperature range (°C)	-40 to +85								
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)								
Leakage current (µA)	Less than 0.01CV or 4 whichever is larger (after 2 minutes) C: Rated capacitance(µF); V: Rated voltage(V) (20°C)								
Tangent of loss angle (tanδ)	Rated voltage (V)	6.3	10	16	25	35	50	63	100
	tanδ (max.)	0.24	0.20	0.16	0.15	0.14	0.12	0.10	0.09
0.02 is added to every 1000µF increase over 1000µF. (20°C, 120Hz)									
Characteristics at high and low temperature	Rated voltage (V)	6.3	10	16	25	35	50	63	100
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3	2	2	2	2	2
0.5 for -25°C, 1 for -40°C are added to every 1000µF increase over 1000µF. (120Hz)									
Endurance (85°C) (Applied ripple current)	Test time	250h x 8							
	Leakage current	The initial specified value or less							
	Percentage of capacitance change	Within ±20% of initial value							
	Tangent of the loss angle	150% or less of the initial specified value							
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)								

### Outline Drawing



### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz)			
	50 · 60	120	1k	10k · 100k
6.3 to 16	0.8	1	1.1	1.2
25 to 35	0.8	1	1.5	1.7
50 to 100	0.8	1	1.6	1.9

### Part numbering system (example: 10V100µF)

RBD	—	10	V	102	M	I5	□	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol	

### Case symbol

Case	Casing Symbol	Case	Casing Symbol	Case	Casing Symbol	Case	Casing Symbol
φ DxL(mm)		φ DxL(mm)		φ DxL(mm)		φ DxL(mm)	
5x11	E3	10x12.5	H3	12.5x20	I5	16x31.5	J7
6.3x11	F3	10x16	H4	12.5x25	I6	16x35.5	J8
8x11.5	G3	10x20	H5	16x25	J6	18x35.5	K8
						18x40	K9

### Standard Ratings

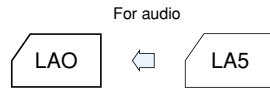
Rated capacitance(µF)	6.3		10		16		25		35		50		63		100	
	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
Item	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms	φ DxL(mm)	mArms
0.1	—	—	—	—	—	—	—	—	—	—	5x11	4	—	—	5x11	5
0.22	—	—	—	—	—	—	—	—	—	—	5x11	7	—	—	5x11	8
0.33	—	—	—	—	—	—	—	—	—	—	5x11	8	—	—	5x11	9
0.47	—	—	—	—	—	—	—	—	—	—	5x11	10	—	—	5x11	11
1	—	—	—	—	—	—	—	—	—	—	5x11	14	—	—	5x11	16
2.2	—	—	—	—	—	—	—	—	—	—	5x11	21	5x11	23	5x11	24
3.3	—	—	—	—	—	—	—	—	—	—	5x11	26	5x11	28	6.3x11	34
4.7	—	—	—	—	—	—	5x11	28	5x11	28	5x11	31	5x11	34	6.3x11	41
10	—	—	—	—	5x11	39	5x11	40	5x11	42	5x11	45	6.3x11	57	8x11.5	70
22	—	—	5x11	52	5x11	58	5x11	60	6.3x11	71	6.3x11	77	8x11.5	89	10x16	136
33	5x11	58	5x11	63	5x11	71	6.3x11	84	6.3x11	87	8x11.5	111	10x12.5	144	10x20	181
47	5x11	69	5x11	75	6.3x11	97	6.3x11	100	8x11.5	122	10x12.5	157	10x16	188	12.5x20	248
100	6.3x11	115	6.3x11	126	8x11.5	167	10x12.5	204	10x12.5	212	10x20	273	12.5x20	343	16x25	458
220	8x11.5	202	8x11.5	221	10x12.5	294	10x16	332	10x20	375	12.5x25	506	16x25	645	18x35.5	837
330	8x11.5	247	10x12.5	322	10x16	394	10x20	444	12.5x20	526	12.5x25	620	—	—	—	—
470	10x12.5	350	10x16	420	10x20	513	12.5x20	607	12.5x25	685	16x25	861	—	—	—	—
1000	10x20	611	12.5x20	767	12.5x25	935	16x25	1120	16x31.5	1270	—	—	—	—	—	—
2200	12.5x25	1090	16x25	1380	16x31.5	1660	—	—	—	—	—	—	—	—	—	—
3300	16x25	1490	16x31.5	1760	—	—	—	—	—	—	—	—	—	—	—	—
4700	16x31.5	1880	18x35.5	2280	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz

Power Supply Smoothing Use, Standard Capacitors (Common name : TONEREX)

GREEN CAP For audio

- Adopting the newly developed formation method and composite electrolytic paper for audio application has reduced distortion, achieving high-quality sound.
- Best suited as power supply filters for sound quality priority audio equipment.
- Printed circuit board terminal snap-in type.

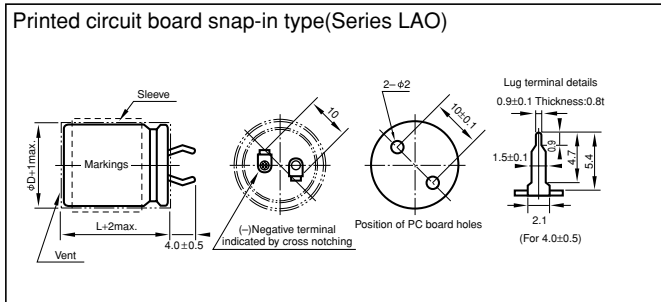


Specifications

Item	Performance			
Category temperature range (°C)	-40 to +85			
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)			
Leakage current (µA)	Less than 0.03CV or 5mA whichever is smaller (after 5 minutes) C: Rated capacitance(µF), V: Rated voltage(V) (20°C)			
Tangent of loss angle (tanδ)	Rated voltage (V)	16	25	35
	tanδ (max.)	0.40	0.40	0.35
Characteristics at high and low temperature	Rated voltage (V)	16 to 35	50 to 100	
	Impedance ratio (max.)	Z-25°C / Z+20°C	4	3
		Z-40°C / Z+20°C	15	10
Endurance (85°C) (Applied ripple current)	Test time	1000 hours		
	Leakage current	The initial specified value or less		
	Percentage of capacitance change	Within ±20% of initial value		
	Tangent of the loss angle	150% or less of the initial specified value		
Shelf life (85°C)	Test time : 1000 hours. Other have same as endurance. Voltage application treatment			
Applicable standards	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)			

Outline Drawing

Unit: mm



Coefficient of Frequency for Rated Ripple Current

Frequency(Hz)	50	120	1k	10k	20k
Rated voltage(V)					
50 or less	0.95	1	1.10	1.15	1.15
63 to 100	0.95	1	1.16	1.30	1.33

Part numbering system (example: 63V6800µF)

Printed circuit board snap-in type	LAO	—	63V	682	MPD	S4	#
	Series code		Rated voltage symbol	Rated capacitance symbol		Casing symbol	Additional symbol

• The standard ratings are described on the next page.

\* There are overseas factory product only on this page.

NOTE  
Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

## Standard Ratings

Rated voltage(V)		16		25		35		50		63		80		100	
Case øDxL(mm)	Item Casing symbol	Rated capacitance	Rated ripple current	Rated capacitance	Rated ripple current	Rated capacitance	Rated ripple current	Rated capacitance	Rated ripple current	Rated capacitance	Rated ripple current	Rated capacitance	Rated ripple current	Rated capacitance	Rated ripple current
		μF	Arms	μF	Arms	μF	Arms	μF	Arms	μF	Arms	μF	Arms	μF	Arms
22x20	S1	3300	1.2	—	—	—	—	—	—	—	—	—	—	—	—
22x25	S1	4700	1.5	2200	1.0	1500	0.8	1000	0.8	680	0.7	—	—	—	—
22x30	S1	—	—	3300	1.3	2200	1.3	1500	1.1	1000	0.9	680	0.7	—	—
22x35	S1	6800	2.0	4700	1.7	3300	1.7	—	—	1500	1.2	1000	1.0	680	0.8
22x40	S1	—	—	—	—	—	—	2200	1.5	—	—	—	—	—	—
22x45	S1	10000	2.7	6800	2.2	4700	2.3	—	—	2200	1.6	—	—	—	—
22x50	S1	—	—	—	—	—	—	3300	2.0	—	—	1500	1.3	1000	1.2
25x25	S2	—	—	3300	1.7	2200	1.7	1500	1.4	1000	1.2	680	1.0	—	—
25x30	S2	6800	2.5	4700	2.1	3300	2.2	2200	1.8	1500	1.5	1000	1.2	680	1.1
25x35	S2	10000	3.2	—	—	—	—	—	—	—	—	—	—	—	—
25x40	S2	—	—	6800	2.7	4700	2.8	3300	2.3	2200	1.9	1500	1.6	1000	1.4
25x45	S2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25x50	S2	—	—	10000	3.0	6800	2.6	4700	2.4	3300	2.0	2200	2.0	1500	1.8
30x25	S3	6800	2.6	4700	2.2	3300	2.3	2200	1.9	1500	1.6	1000	1.3	680	1.1
30x30	S3	10000	3.3	6800	2.7	4700	2.8	3300	2.4	2200	1.9	1500	1.6	1000	1.4
30x35	S3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
30x40	S3	—	—	10000	3.1	6800	2.7	4700	2.4	3300	2.1	2200	2.1	1500	1.8
30x45	S3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
30x50	S3	—	—	—	—	10000	3.4	6800	3.1	4700	2.6	3300	2.2	2200	1.8
35x25	S4	10000	3.4	6800	2.8	4700	2.9	3300	2.4	2200	2.0	1500	1.7	1000	1.5
35x30	S4	—	—	10000	3.1	6800	2.7	4700	2.5	3300	2.1	2200	2.1	1500	1.8
35x35	S4	—	—	—	—	—	—	—	—	—	—	—	—	—	—
35x40	S4	—	—	—	—	10000	3.5	6800	3.1	4700	2.6	3300	2.2	2200	1.8
35x45	S4	—	—	—	—	—	—	—	—	—	—	—	—	—	—
35x50	S4	—	—	—	—	—	—	—	—	6800	3.3	4700	2.7	—	—

(Note) Rated ripple current : 85°C, 120Hz.

\* There are overseas factory product only on this page.

# 1 General Description of Aluminum Electrolytic Capacitors

## 1-1 The Principle of Capacitor

The principle of capacitor can be presented by the principle drawing as in Fig.1-1.

When a voltage is applied between the metal electrodes placed opposite on both surfaces of a dielectric, electric charge can be stored proportional to the voltage.

$$Q=C \cdot V$$

Q : Quantity of electricity (C)

V : Voltage (V)

C : Capacitance (F)

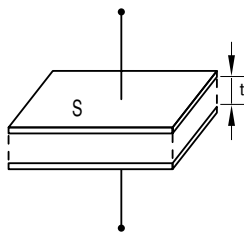


Fig.1-1

C, called the capacitance of capacitor, is expressed by the following expression with the electrode area S[m<sup>2</sup>], the electrode spacing t [m] and the dielectric constant of dielectric “ε”:

$$C[F] = \epsilon_0 \cdot \epsilon \cdot \frac{S}{t}$$

ε<sub>0</sub>: Dielectric constant in vacuum (=8.85x10<sup>-12</sup>F/m)

The dielectric constant of an aluminum oxide film is 7 to 8. Larger capacitances can be obtained by enlarging the electrode area S or reducing t.

Table 1-1 shows the dielectric constants of typical dielectrics used in the capacitor. In many cases, capacitor names are determined by the dielectric material used, for example, aluminum electrolytic capacitor, tantalum capacitor, etc.

Table 1

Dielectric	Dielectric Constant	Dielectric	Dielectric Constant
Aluminum oxide film	7 to 8	Porcelain (ceramic)	10 to 120
Mylar	3.2	Polystyrene	2.5
Mica	6 to 8	Tantalum oxide film	10 to 20

Although the aluminum electrolytic capacitor is small, it has a large capacitance. It is because the electrode area is roughened by electrochemical etching, enlarging the electrode area and also because the dielectric is very thin.

The schematic cross section of the aluminum electrolytic capacitor is as in Fig.1-2.

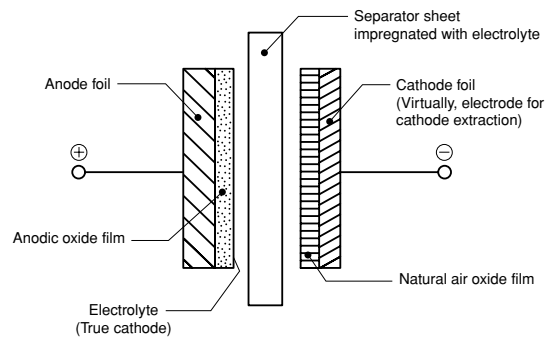
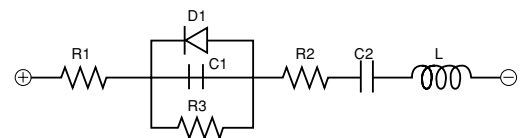


Fig.1-2

## 1-2 Equivalent Circuit of the Capacitor

The electrical equivalent circuit of the aluminum electrolytic capacitor is as presented in Fig. 2.



R1 : Resistance of terminal and electrode

R2 : Resistances of anodic oxide film and electrolyte

R3 : Insulation resistance because of defective anodic oxide film

D1 : Oxide semiconductor of anode foil

C1 :Capacity of anode foil

C2 : Capacity of cathode foil

L : Inductance caused by terminals, electrodes, etc.

# 2 About the Life of an Aluminum Electrolytic Capacitor

## 2-1 Estimation of life with minimal ripple current (negligible).

Generally, the life of an aluminum electrolytic capacitor is closely related with its ambient temperature and the life will be approximately the same as the one obtained by Arrhenius' equation.

$$L = L_0 \times 2^{\left(\frac{T_0 - T}{10}\right)} \dots\dots\dots(1)$$

Where L : Life at temperature T  
L<sub>0</sub> : Life at temperature T<sub>0</sub>

The effects to the life by derating of the applied voltage etc. are neglected because they are small compared to that by the temperature.



## 2-2 Estimation of life considering the ripple current.

The ripple current affects the life of a capacitor because the internal loss (ESR) generates heat. The generated heat will be:

$$P = I^2 R \dots\dots\dots(2)$$

Where I : Ripple current (Arms)

R : ESR ( $\Omega$ )

With increase in the temperature of the capacitor:

$$\Delta T = \frac{I^2 \cdot R}{A \cdot H} \dots\dots\dots(3)$$

Where  $\Delta T$  : Temperature increase in the capacitor core(deg.)

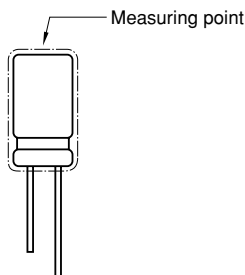
I : Ripple current (Arms)

R : ESR ( $\Omega$ )

A : Surface area of the capacitor ( $\text{cm}^2$ )

H : Radiation coefficient (Approx.  $1.5 \sim 2.0 \times 10^{-3} \text{ W/cm}^2 \times ^\circ\text{C}$ )

The above equation (3) shows that the temperature of a capacitor increases in proportion to the square of the applied ripple current and ESR, and in inverse proportion to the surface area. Therefore, the amount of the ripple current determines the heat generation, which affects the life. The value of  $\Delta T$  varies depending on the capacitor types and operating conditions. The usage is generally desirable if  $\Delta T$  remains less than  $5^\circ\text{C}$ . The measuring point for temperature increase due to ripple current is shown below;



Test results:

(1) The life equation considering the ambient temperature and the ripple current will be:

$$L = L_d \times 2^{\left(\frac{T_0 - T}{10}\right)} \times K^{\left(\frac{-\Delta T}{10}\right)} \dots\dots\dots(4)$$

Where  $L_d$ : Life at DC operation (h)

K: Ripple acceleration factor

(K=2, if with in allowable ripple current)

(K=4, if exceeding allowable ripple current)

$T_0$ : Upper category temperature ( $^\circ\text{C}$ )

T: Operating temperature ( $^\circ\text{C}$ )

$\Delta T$ : Temperature increase at capacitor core (deg.)

(2) The life equation based on the life with the rated ripple current applied under the maximum guaranteed temperature will be a conversion of the above equation (4), as below:

$$L = L_r \times 2^{\left(\frac{T_0 - T}{10}\right)} \times K^{\left(\frac{-\Delta T}{10}\right)} \dots\dots\dots(5)$$

Where  $L_r$ : Life at the upper category temperature with the rated ripple current (h)

$\Delta T_0$ : Temperature increase at capacitor core, at the upper category temperature (deg.)

(3) The life equation considering the ambient temperature and the ripple current will be a conversion of the above equation (5), as below:

$$L = L_r \times 2^{\left(\frac{T_0 - T}{10}\right)} \times K^{\left\{1 - \left(\frac{I}{I_0}\right)^2\right\}} \times \frac{\Delta T_0}{10} \dots\dots\dots(6)$$

Where  $I_0$ : Rated ripple current at the upper category temperature (Arms)

I : Applied ripple current (Arms)

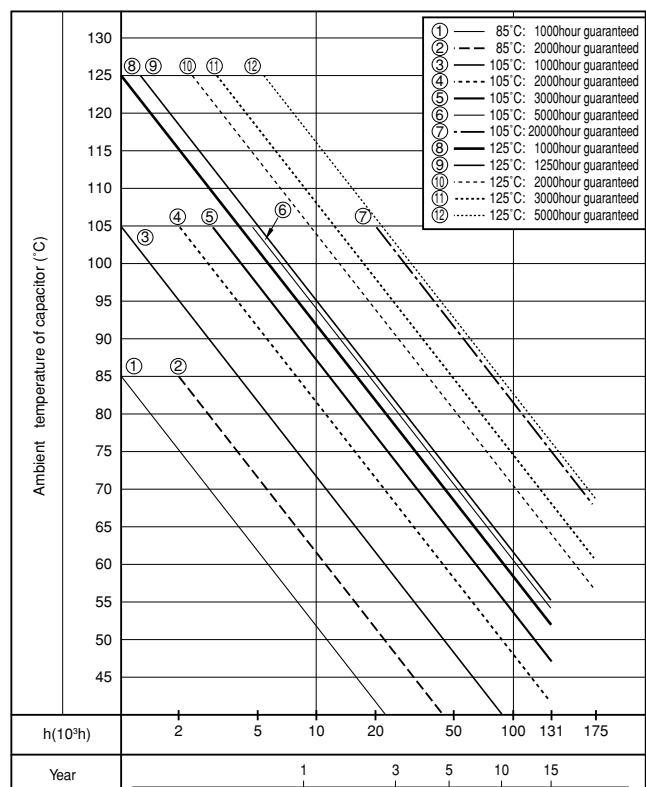
Since it is actually difficult to measure the temperature increase at the capacitor core, the following table is provided for conversion from the surface temperature increase to the core temperature increase.

Table 2-1

Case diameter	~10	12.5~16	18	22	25	30	35
Core / Surface	1.1	1.2	1.25	1.3	1.4	1.6	1.65

The life expectancy formula shall in principle be applied to the temperature range between the ambient temperature of  $+40^\circ\text{C}$  and upper category temperature. The expected life time shall be about fifteen years at maximum as a guide in terms of deterioration of the sealant.

(Table 2-1 Life Expectancy Chart)





2-2 Practical Examples of Life Expectancy

As practical examples of life expectancy, we introduce 250V 560 μ F in the LAG Series considering the effect of high-frequency component. Figures 2-1 to 2-3 show the simulated ripple current waveforms when the high-frequency component for switching is superimposed on the commercial frequency component.



Fig.2-1 Ripple Current Waveform of Capacitor

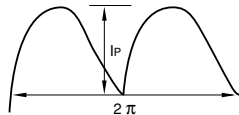


Fig.2-2 Low-frequency component

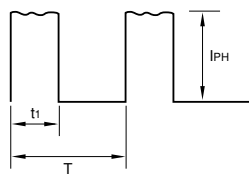


Fig.2-3 High-frequency component

Each of the above may be obtained as the effective ripple current value. Assuming that the ripple current waveform of the low-frequency component is generally approximated to the full-wave rectification waveform as shown in Fig.2-2, we obtain the effective ripple current value  $I_L$  as follows:

$$I_L = \sqrt{\frac{I_{PL}}{2}} = 0.707 \cdot I_{PL}$$

Since the ripple current waveform of the high-frequency component is approximated to the rectangular as shown in Fig.2-3, the effective current value of high-frequency component  $I_H$  is given by

$$I_H = \sqrt{\frac{1}{T} \int_0^{t_1} I_{PH}^2 dt} = I_{PH} \sqrt{\frac{t_1}{T}}$$

The reason why the ripple current affects the life is due to the heat generated by the ESR (R) of capacitor. That is,  $\Delta T$  by heat generation can be expressed by  $\Delta T \propto I^2 \cdot R$  from Expression (2).

Therefore, when ripple currents with different frequencies are handled, each current value must first be squared and then summed. That is:

$$I = \sqrt{(I_L)^2 + (I_H)^2}$$

Now, we proceed to specific examples assuming that the effective ripple current values of low-and high-frequencies have been obtained by the above methods. Data A (Test piece and basic data)

Product name	: 250V 560 μF ø 30x40 L, Series LAG
$L_r$	=2000
K	= 4
$T_o$	=105°C
$\Delta T_o$	= 5deg
$I_o$	=1.74Arms at 105°C, 120 Hz

To verify the effect of the high-frequency component, the expected life will be calculated for each of three high-frequency ripple current conditions.

Data B

$I_L$	=2.4Arms at 120Hz, T=45°C
$I_{H1}$	=0.36Arms at 20kHz (corresponding to 15% of the commercial frequency component)
$I_{H2}$	=0.72Arms at 20kHz (corresponding to 30% of the commercial frequency component)
$I_{H3}$	=1.2Arms at 20kHz (corresponding to 50% of the commercial frequency component)

For Data B, the currents are converted to 120 Hz by the frequency conversion factor for the cases of ignorance of the high-frequency component, and each high-frequency component condition.

$$I = 2.4/1 = 2.4$$

$$I_1 = \sqrt{(2.4)^2 + (0.36/1.18)^2} \approx 2.42A$$

$$I_2 = \sqrt{(2.4)^2 + (0.72/1.18)^2} \approx 2.48A$$

$$I_3 = \sqrt{(2.4)^2 + (1.2/1.18)^2} \approx 2.61A$$

Explained here is about the frequency conversion factor. As described above, the heat generation (or temperature rise =  $\Delta T$ ) affecting the life is proportional to the ESR of capacitor. In addition, the fundamental frequency is 120 Hz in measurement of capacitor characteristics, and the ripple current is also specified with this frequency; it is thus more convenient to calculate by converting the current value to that with the same temperature rise at 120 Hz.

The ESR of aluminum electrolytic capacitor is frequency dependent.

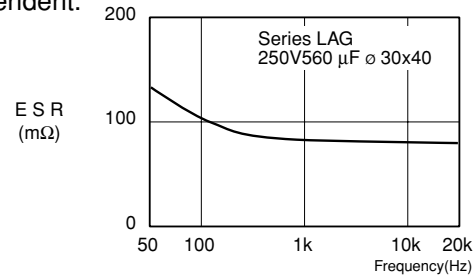


Fig.2-4 Frequency Characteristics of ESR

Figure 2-4 shows a typical example of frequency characteristics of ESR, indicating that the ESR decreases with increasing frequencies. Therefore, the high-frequency component has less effect on the heat generation of capacitor than low-frequency component. Next, we calculate the expected life according to each condition to compare with the case with no high-frequency component.

For the case with no high-frequency component:

$$L = 2000 \times 2 \left(\frac{105-45}{10}\right) \times 4 \left[1 - \left(\frac{2.4}{1.74}\right)^2\right] \times \frac{5}{10} \approx 68,470 \text{ hours}$$

For the case with high-frequency component:

$$L_1 = 2000 \times 2 \left(\frac{105-45}{10}\right) \times 4 \left[1 - \left(\frac{2.48}{1.74}\right)^2\right] \times \frac{5}{10} \approx 66,980 \text{ hours}$$

66,980/68,470 0.978, about a 2.2% reduction in life

$$L_2 = 2000 \times 2 \left(\frac{105-45}{10}\right) \times 4 \left[1 - \left(\frac{2.48}{1.74}\right)^2\right] \times \frac{5}{10} \approx 62,620 \text{ hours}$$

62,620/68,470 0.914, about an 8.6% reduction in life

$$L_3 = 2000 \times 2 \left(\frac{105-45}{10}\right) \times 4 \left[1 - \left(\frac{2.61}{1.74}\right)^2\right] \times \frac{5}{10} \approx 53,820 \text{ hours}$$

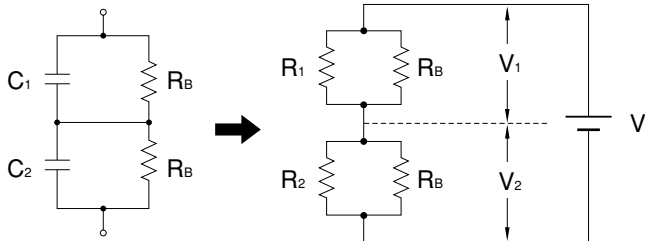
53,820/68,470 ≈ 0.786, about a 21.4% reduction in life

As described above, there may be cases where the effect of larger high-frequency component on the life cannot be ignored; thus high-frequency component exceeding 30% with respect to the current with fundamental frequency should be considered.

### 3 To calculate Balance when connecting in series

#### 3-1 Circuit layout

Circuit for connecting two capacitors (C1, C2) in series and equivalent circuit can be illustrated as below figure. Formula to calculate a balance resistance  $R_B$  of below figure is shown as follows.



Following are the preconditions of the circuit.

- ①  $V_2$  shall be the rated voltage ( $=V_0$ ). ( $V_1 < V_2$ )
- ②  $V$  shall be a times  $V_0 \times 2$ .  $V = 2aV_0$  ( $a < 1$ )
- ③  $R_2$  shall equal  $R_1 \times b$ . ( $b < 1$ ) (1)

#### 3-2 Formulas to calculate $[R_B]$

3-2-1 Following formula can be established from balanced condition.

$$V_1 \left[ \frac{1}{R_1} + \frac{1}{R_B} \right] = V_2 \left[ \frac{1}{R_1} + \frac{1}{R_B} \right] \quad (2)$$

3-2-2 Following formula can be established from preconditions.

$$V_2 \leq V_0 \quad (3)$$

$$V_1 = V - V_2 \quad (4)$$

$$= 2aV_0 - V_2 \quad (4')$$

3-2-3 Put formulas (1), (3) and (4') in formula (2).

$$(2aV_0 - V_2) \left[ \frac{R_1 + R_B}{R_1 \cdot R_B} \right] = V_2 \left[ \frac{bR_1 + R_B}{bR_1 \cdot R_B} \right]$$

$$2abV_0 (R_1 + R_B) = V_2 \{ b(R_1 + R_B) + bR_1 + R_B \}$$

$$2ab(R_1 + R_B) \leq 2bR_1 + (1+b)R_B$$

Accordingly, balance resistance  $R$  shall be the following formula.

$$R_B \leq 2bR_1 \frac{(1-a)}{(2a-1) \cdot b-1} \quad (5)$$

#### 3-3 Calculation Example.

Calculate the value of the balance resistance in the case of connecting two 400V 470 $\mu$ F ( LC standard value : 1.88mA) capacitors in series.

$$R_1 = \frac{400(V)}{1.88(mA)} = 213(k\Omega)$$

If  $a=0.8$ ,  $400(V) \times 2 \times 0.8 = 640(V)$  as an impressed voltage.

If  $b=2$ ,  $R_2 = b R_1 = 426(k\Omega)$ ,  $LC=0.94(mA)$ .

Balance resistance  $R_B$  will be.

$$R_B \leq 2 \times 2 \times 213(k\Omega) \frac{(1-0.8)}{(2 \times 0.8) \times 2 - 1} = 852(k\Omega)$$

### 4 Regarding Recovery Voltage

• After charging and then discharging the aluminum electrolytic capacitor, and further causing short-circuit to the terminals and leave them alone, the voltage between the two terminals will rise again after some interval. Voltage caused in such case is called recovery voltage. Following is the process that causes this phenomenon:

• When the voltage is impressed on a dielectric, electrical transformation will be caused inside the dielectric due to dielectric action, and electrification will occur in positive-negative opposite to the voltage impressed on the surface of the dielectric. This phenomenon is called polarization action.

• After the voltage is impressed with this polarization action, and if the terminals are discharged till the terminal voltage reaches 0 and are left open for a while, an electric potential will arise between the two terminals and thus causes recovery voltage.

• Recovery voltage comes to a peak around 10 to 20 days after the two terminals are left open, and then gradually declines. Recovery voltage has a tendency to become bigger as the component (stand-alone base type) becomes bigger.

• If the two terminals are short-circuited after the recovery voltage is generated, a spark may scare the workers working in the assembly line, and may put low-voltage driven components (CPU, memory, etc.) in danger of being destroyed. Measures to prevent this is to discharge the accumulated electric charge with resistor of about 100 to 1k $\Omega$  before using, or ship out by making the terminals in short-circuit condition by covering them with an aluminum foil at the production stage. Please consult us for adequate procedures.

## 5 Electrode Foil Development Technology

### 5-1 Corrosion inhibition of cathode foil

Inactive treatment is implemented to ensure long life by inhibiting natural corrosion of the cathode foil. Fig. 3-1 shows its effects with values of the polarization resistance inversely proportional to the corrosion rate using the AC impedance method(FRA). This indicates that the cathode foil used in the “Safety’s” capacitors has the polarization resistance higher than that of the conventional capacitors owing to corrosion inhibition.

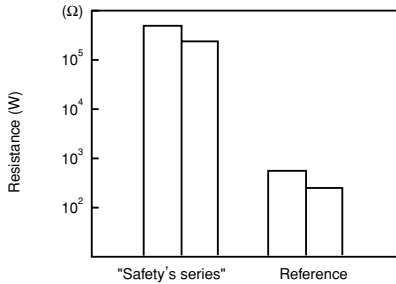


Fig. 3-1

### 5-2 Sealing material permeability of electrolyte

To ensure long life, a low permeable lactone solvent for the sealing material is used as the main solvent of the electrolyte of the “Safety’s” capacitor. Fig. 3-2 shows the test results on the permeability obtained by changing the weight of the capacitors produced with different types of electrolytes at a high temperature.

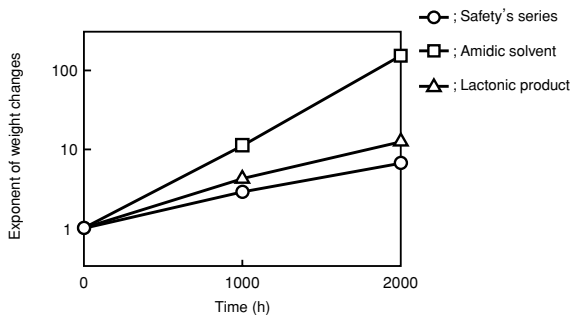


Fig. 3-2

### 5-3 Airtightness of sealing material

Since the electrolyte is stable for hours, the key element for capacitor’s life is the sealing material. By optimizing the crosslinking density of the sealing material polymer, the sealing material of the “Safety’s” capacitor attains its long life with electrolyte permeability less than that of the conventional capacitors.

Fig. 3-3 shows the test results on the airtightness of the sealing material obtained by changing the weight of the capacitors at a high temperature, producing capacitors with the conventional sealing material and improved one both containing the electrolyte used in the “Safety’s” capacitor.

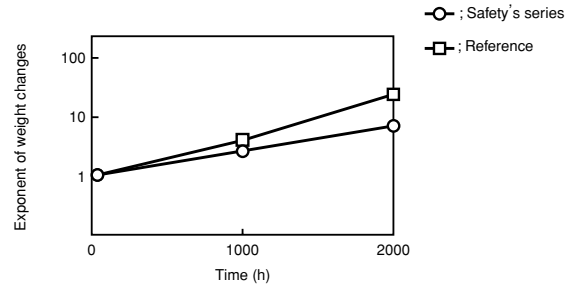


Fig. 3-3

### 5-4 Long-time stability of electrolyte

The electrolyte used in the “Safety’s” capacitor is stable with low initial resistivity and small secular changes at a high temperature. Fig. 3-4 shows change in resistivity at 105°C.

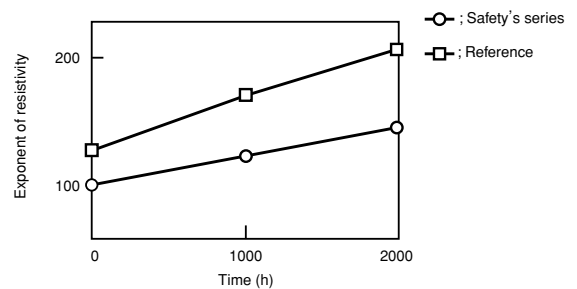


Fig. 3-4

### 5-5 Dielectric formation voltage and leakage current characteristics of anode foil

To increase the operating life by controlling the gas generation inside capacitor because of 1.5 to 2 times the rated voltage, while that of the previous capacitor is about 1.3 times the rated voltage.

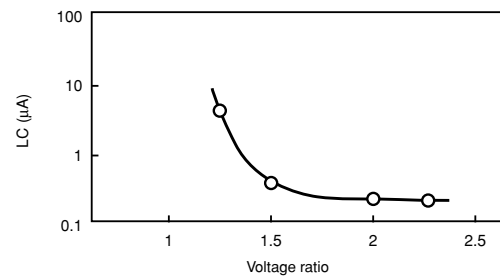


Fig. 3-5

### 5-6 Lowered ESR of Electrode Foil

To reduce the ESR of electrolytic capacitor, we have improved our chemical conversion technology for anode foil to develop lower ESR electrode foil compared to the conventional product as shown in Fig. 3-6

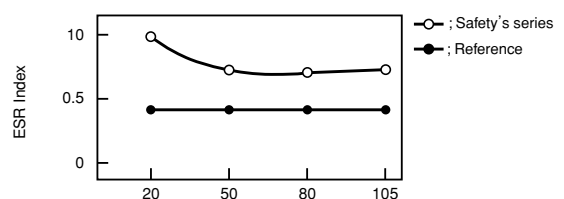
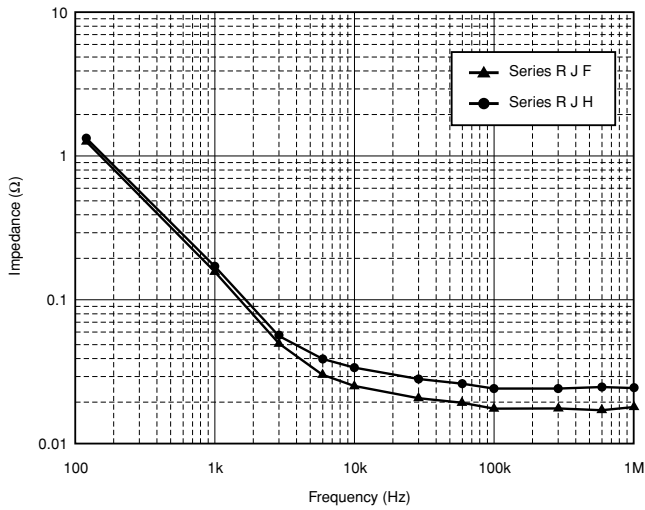


Fig. 3-6 ESR Index of Anode Foil

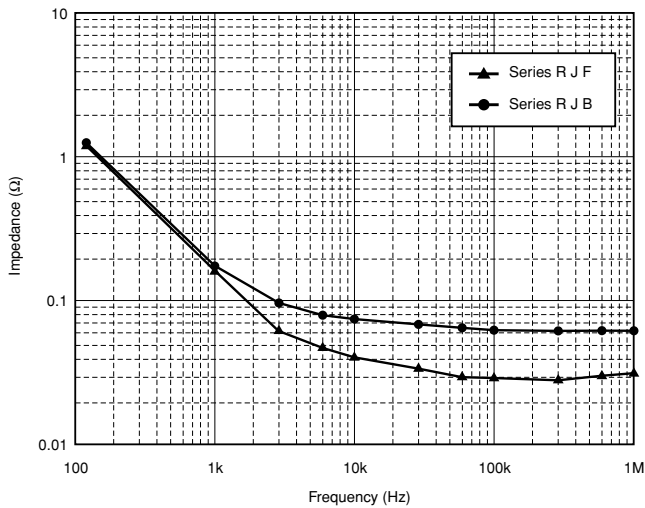
### 6. Electric Characteristics Data

#### 6-1 Series RJF, RJB, RJH

#### Frequency characteristics at 20°C

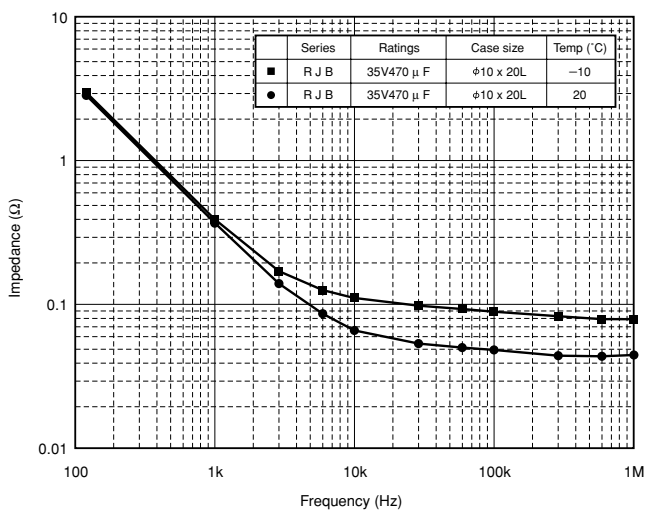


Performanse	Series	R J F	R J H
Rated Voltage		25V	25V
Capacitance		1000 μF	1000 μF
Size( φ x L )		12.5 x 20	12.5 x 25
Impedance Spec. (20°C, 100kHz)		0.021 Ω	0.034 Ω



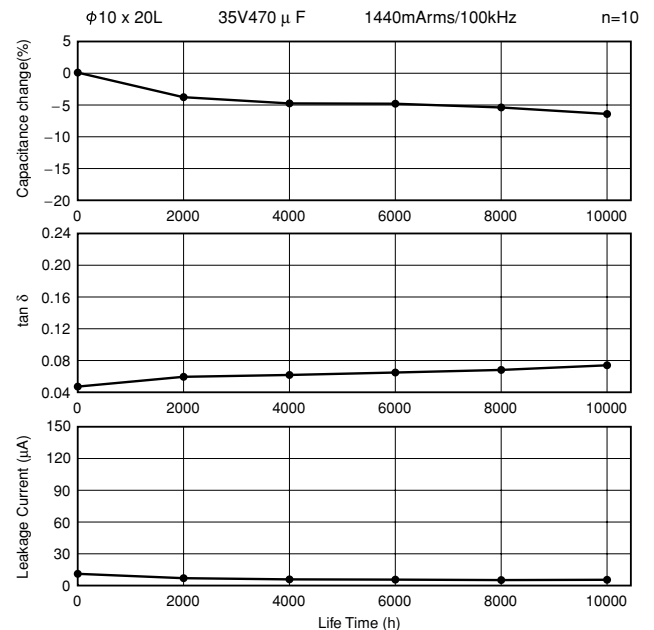
Performanse	Series	R J F	R J B
Rated Voltage		10V	10V
Capacitance		1000 μF	1000 μF
Size( φ x L )		10 x 16	10 x 16
Impedance Spec. (20°C, 100kHz)		0.038 Ω	0.080 Ω

#### Frequency characteristics at 20°C, -10°C



#### Endurance (Applied ripple current) at 105°C

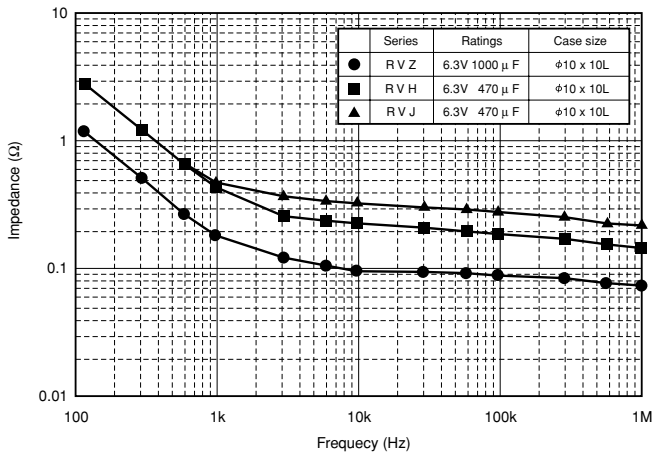
##### Series R J B



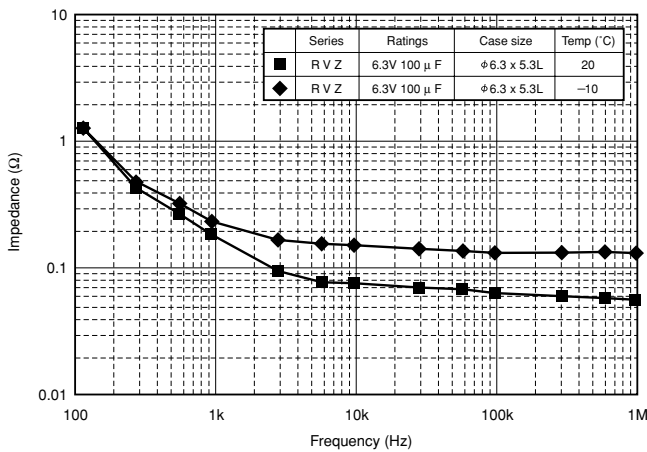
Notice: The mesurment values are not guaranteed values, but measurements.

**6-2 Series RVZ**

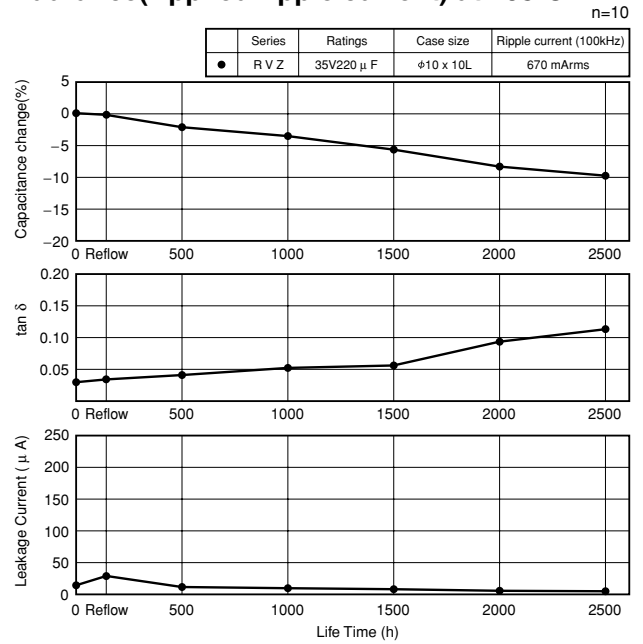
**Frequency characteristics at 20°C**



**Frequency characteristics at 20°C, -10°C**

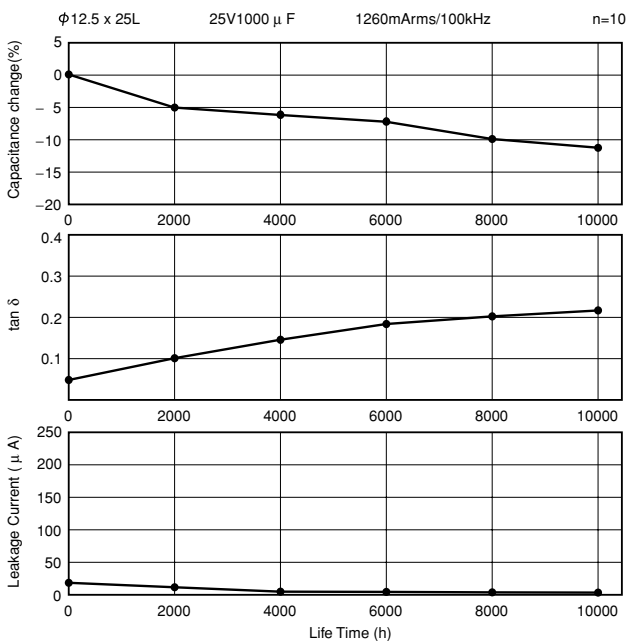


**Endurance (Applied ripple current) at 105°C**

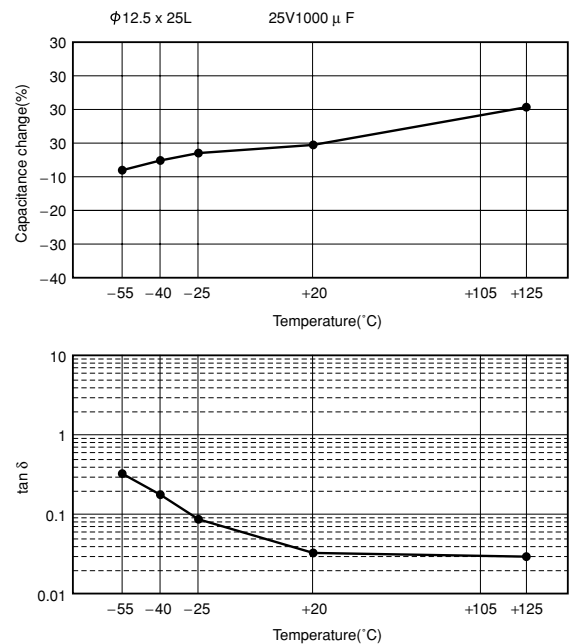


**6-3 Series RK**

**Endurance (Applied ripple current) at 125°C**



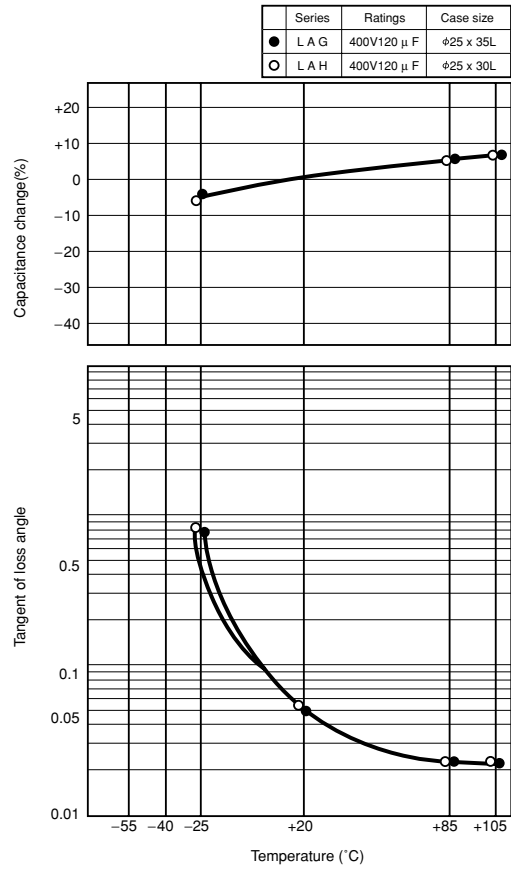
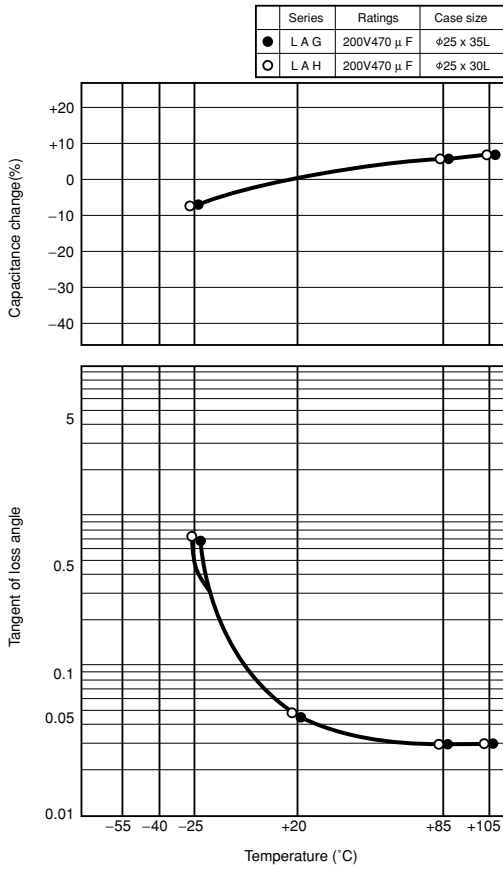
**Temperature Characteristics**



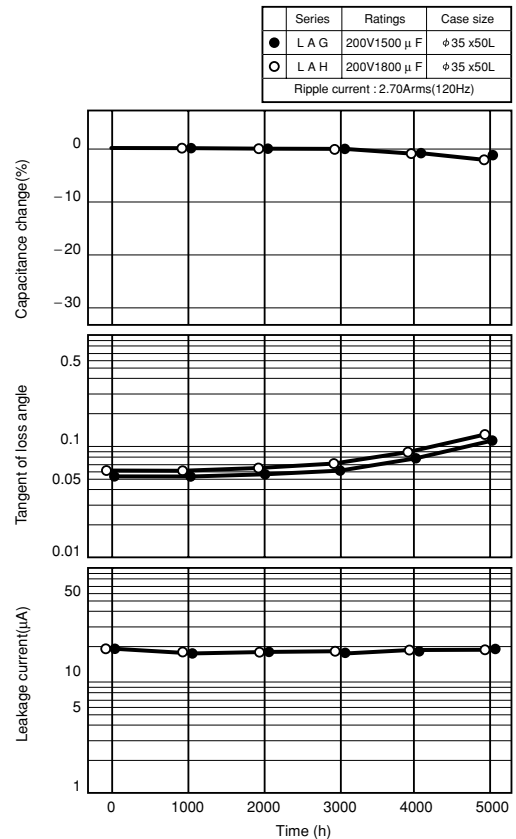
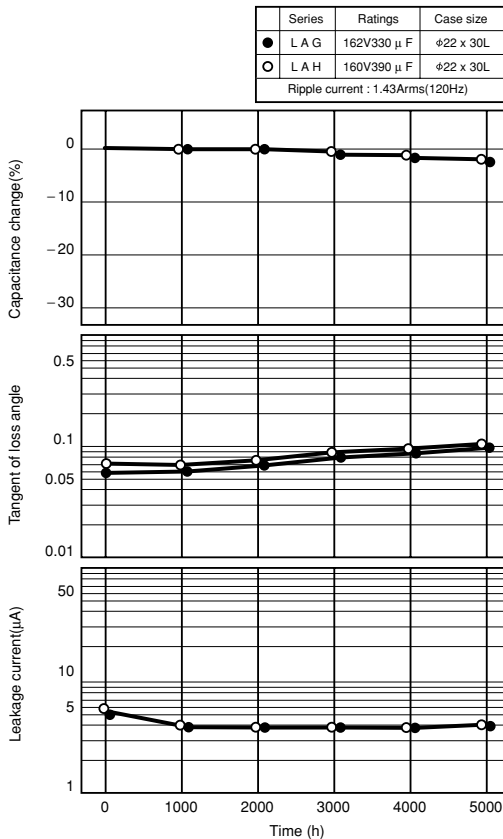
Notice: The measurement values are not guaranteed values, but measurements.

## 6-4 Series LAG • LAH

### Temperature characteristics, Series LAG • LAH



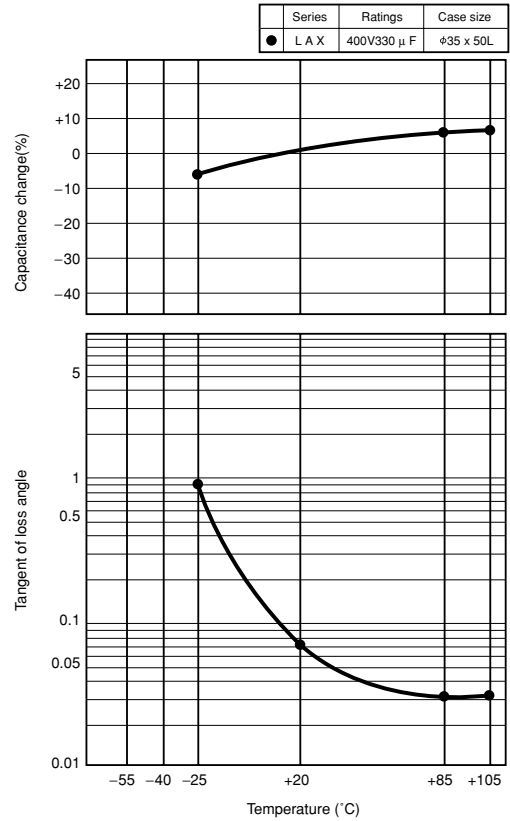
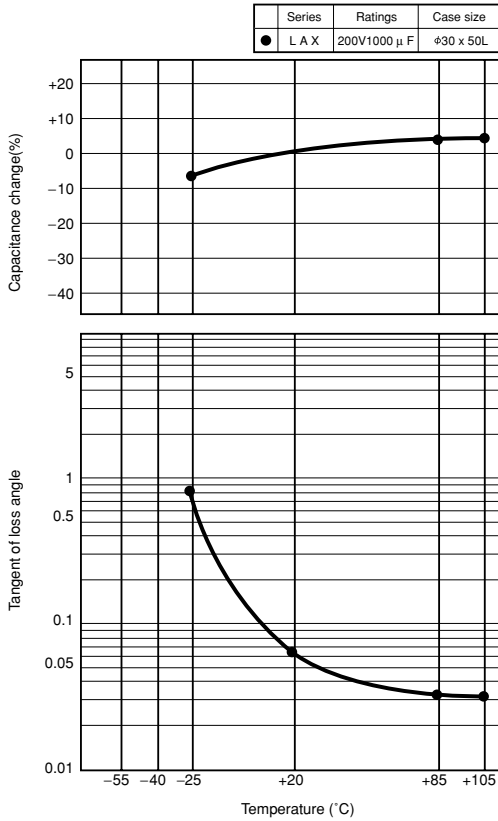
### Endurance (Applied ripple current) at 105°C of Series LAG • LAH



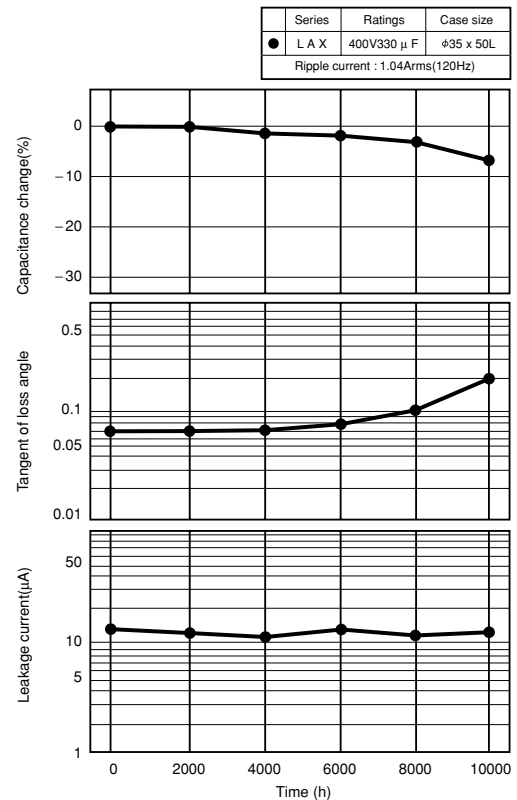
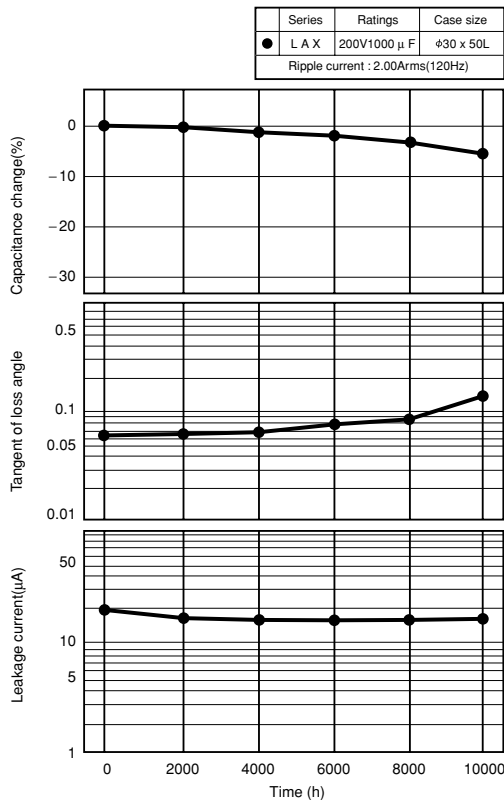
Notice: The measurement values are not guaranteed values, but measurements.

**6-5 Series LAX**

**Temperature characteristics, Series LAX**



**Endurance(Applied ripple current) at 105°C of Series LAX**



Notice: The mesurment values are not guaranteed values, but measurements.

# MEMO



# ELNA<sup>®</sup>

## Tantalum Chip Capacitors

### List of Contents

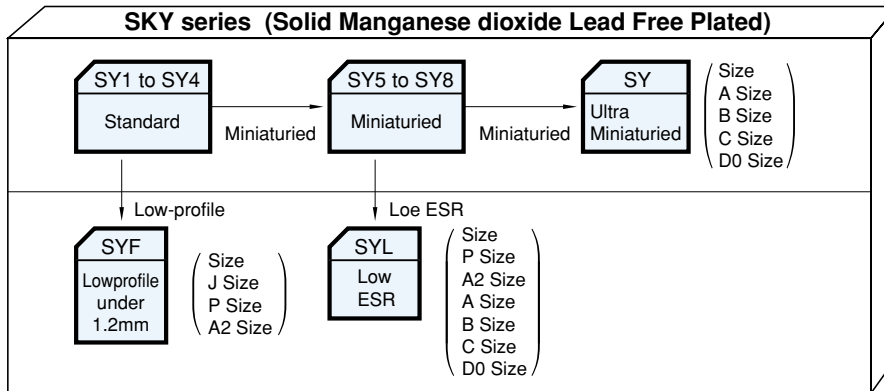
1. Type List, Systematized Classification .....	124
2. Cautions for Using .....	125
3. Taping .....	127
4. Dimensions, Marking, Part No System .....	128
5. SYF Series Standard Ratings .....	129
6. SKY Series Standard Ratings .....	132
7. SYL Series Standard Ratings .....	137
8. Technical Notes .....	138



■Type list for tantalum Electrolytic capacitors

Series name	SKY (Solid Manganese dioxide Lead-Free Plated)		
Processed style	Resin molded chip type		
Type designation	SYF	SY1 to SY9	SYL
Photograph			
Features	Lowprofile Hight:1.2mm	Standard , Miniaturied & Ultra Miniaturied	Low ESR
Applicable standard	JISC5101-3:1998(IEC60384-3:1989)		
Category temperature range(°C)	-55 to +125°C (Above 85°C use category voltage)		
Rated voltage(VDC)	2.5 to 25	2.5 to 35	4 to16
Rated capacitance(μF)	0.1 to 47	0.1 to 470	1 to 330
Rated capacitance tolerance(%)	±10%, ±20% (However SY9, SYF-J only ±20%)		
Leakage current(μA)	0.01CV(5 min) or less (SK9: 0.1CV(5 min) or less)		

■Systematized classification



Tantalum Chip Capacitors

## ■ Caution for using tantalum chip capacitor. (Refer also to the TECHNICAL NOTE)

Please read product specifications before using ELNA products

### ■ Circuit design

#### 1. Confirm rated performances.

Confirm the working and installation environments of the set, and use the set within the range of specified rated performances.

Since a failure rate has been provided, set your circuit according to the failure rate. The failure rate can be reduced by decreasing the working voltage, working temperature, or limiting rush current by inserting a resistance, and the like.

#### 2. Use the set within rated voltage.

Rated voltage is defined as a maximum peak voltage (the sum of DCV and peak ACV) that can be applied to a capacitor at a maximum working temperature.

Use the set at voltages within the rated voltage. At temperatures more than 85°C, use the set at voltages not more than the derated voltage.

It is recommended to derate working temperature as far as reliability allows.

When the set is used in a low impedance circuit, voltage should not be more than or one third of the recommended rated voltage.

#### 3. Use the set at temperatures within the category temperature range.

At temperatures more than 85°C, apply a voltage not more than the derated voltage. Low temperature usage is advantageous for reliability. If capacitors make self-heat generation by application of ripples or other reasons, take such a temperature rise into consideration.

#### 4. Pay attention to an excessive momentary current.

Since the set's usage in a low-impedance circuit, such as a power circuit, is likely to raise the failure rate. Please be careful about the following matters:

- (1) If the power supply side impedance looking from the capacitor side is low when voltage is applied, a momentary current will likely cause a short circuit or an increased leakage current.

Therefore, insert a resistance of 3Ω/V or higher.

- (2) The use of a fully derated voltage (one third of the rated voltage or lower) is recommended to control rush current and to lower the failure rate.

#### 5. Pay attention to ripple current.

The ripple capability of the tantalum chip capacitor is determined by heat loss of the capacitor element and the heat radiation coefficient of its package case.

When the allowable value is exceeded, the self-heat-generation of the capacitor increases to cause trouble. This must be given much attention.

The sum of the peak DCV value and ripple voltage must not exceed the rated value. Set the DCV so that the peak value does not become a reverse voltage.

#### 6. Do not apply a reverse voltage.

Since the tantalum chip capacitor has polarity, do not apply a reverse voltage to the part. Applying voltage with reversed polarity could cause an abnormal current to damage the capacitor.

When ripple voltage is applied, control it not to exceed the allowable value.

#### 7. Pay attention to frequency characteristics.

Capacitance and tangent of loss angle of tantalum chip capacitors are usually measured at 120Hz.

Increased frequency decreases capacitance and raises tangent of loss angle, which must be given attention in designing.

Tantalum chip capacitors are different from film and ceramic capacitors in characteristics.

Be careful when a tantalum capacitor is used as an alternative.

### ■ Mounting

1. In mounting, confirm the rated voltage, capacitance, and polarity before usage.
2. Don't cut off the materials of the capacitor due to the mounting space and other reasons.
3. Don't apply an excessive force to the capacitor.
4. Do not use the capacitor that has fallen once on the floor.
5. Do not remove and reuse the capacitor that has been mounted once.
6. Connect the capacitors to a tester or multimeter carefully. Avoid applying overvoltage or reverse voltage to the capacitors.

## ■ Caution for using tantalum chip capacitor. (Refer also to the TECHNICAL NOTE)

Please read product specifications before using ELNA products

### ■ Soldering

1. Be sure to observe the soldering conditions stipulated in our catalogs and specifications.

It is very important in terms of reliability that soldering is completed in the shortest possible time and under conditions where the joints will be soldered perfectly.

2. Wash products immediately after the soldering process so that the dregs of flux and the remaining acid and alkali will not be left.

3. Avoid the use of ultrasonic cleaning whenever possible.

If the use of ultrasonic cleaning is unavoidable, make a trial of the system in conditions severer than those in actual cleaning to check for any abnormality.

4. Melting point of terminal plating(Sn 100%) is 232°C. If the soldering of lead free at 232°C or less, confirm the presence of abnormality enough.  
(For the reflow method, soldering from the peak temperature 235°C to 250°C is recommended.)

### ■ In a emergency

1. Do not touch a capacitor directly when the set is being used, it could cause an electric shock.

Never place conductive solutions, such as acid and alkali, on the capacitor. Those solutions could cause a short circuit between circuits or in the capacitor.

2. If a strange smell or smoke is generated from a set in use, turn off the main power supply for the set immediately.

3. If a capacitor burns, combustion and decomposition gases are generated from the wold resin and the like. Therefore, do not get close to the capacitor.

### ■ Storage

1. Keep the products clean at room temperatures (not more than 40°C) and relative humidities (not more than 70°C).

Leaving them at high temperatures and humidities reduces their solderability significantly. Storage in packaged condition is recommended.

2. Keep the product out of direct sun exposure.

3. Store products in a manner that does not apply unnecessary external force.

4. Avoid storage in an area where vibration exists.

5. Fumigation treatment with toxic gas covering the whole wooden container frames as moth proofing during shipment may leave residual toxic gas.

6. Storage for a long period of time deteriorates packaging materials.

Pay attention to taping materials in particular, since they deteriorate easily.

It is recommended to use the capacitor within one year.

### ■ Transportation

Do not drop the products on the floor or on a table.

Since these products use solidified tantalum powder, handle the capacitors carefully because excessive vibration or shock will likely cause reliability reduction.

### ■ Disposal

If any capacitors need to be disposed, treat as industrial waste.

### ■ Other notes

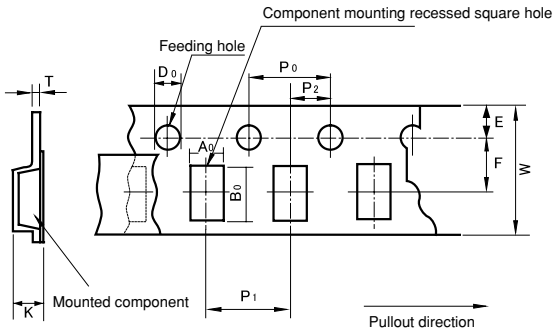
1. In addition to the above-mentioned matters, be sure to confirm the contents of the following document; Technical report of Japan Electronics and Information Technology Industries Association, EIAJ RCR-2368B, the "Guideline of notabilia for fixed tantalum electrolytic capacitors with solid electrolyte for use in electronic equipment"

2. Please understand beforehand that the contents of our catalogs are subject to alteration for improvement without prior notice.

Data mentioned in our catalog are representative values that do not assure performances.

■ Emboss carrier tape dimension

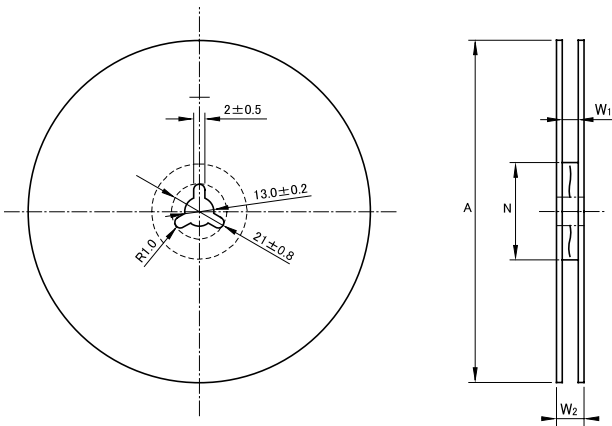
Unit: mm



Size code	A0±0.2	B0±0.2	K±0.2	W±0.3 Tape width	F±0.1	P1±0.1 Pitch of component	E±0.1	P2±0.1	P1±0.1 Feed hole pitch	D0 <sup>+0.1</sup> <sub>-0</sub>	T
J	1.0	1.8	1.1	8.0	3.5	4	1.75	2.0	4.0	1.5	0.2 0.3
P	1.4	2.2	1.2								
A2	1.9	3.5	1.25								
A	1.9	3.5	1.9								
B	3.1	3.8	2.1	12.0	5.5	8					
C	3.7	6.4	2.9		5.7						
D0	4.8	7.7	3.2								

■ Taping reel dimension

Unit: mm



Size code	Tape width	A±2.0	N (Min.)	W2±1.0	W1±0.3
J, P, A2, A, B	8	180	60	11.4	9
C, D0	12	180	60	15.4	13

\*Recycling Reels might be used for the resource conservation.

■ Packaging quantity

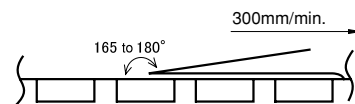
Size code	Quantity / Reel
J	4,000 pcs.
P, A2	3,000 pcs.
A, B	2,000 pcs.
C, D0	500 pcs.

■ Sealing tape reel strength

Peel angle: 165 to 180° referred to the surface on which the tape is glued.

Peel speed: 300mm per minute.

The peel strength must be 0.1 to 0.7N under these conditions.

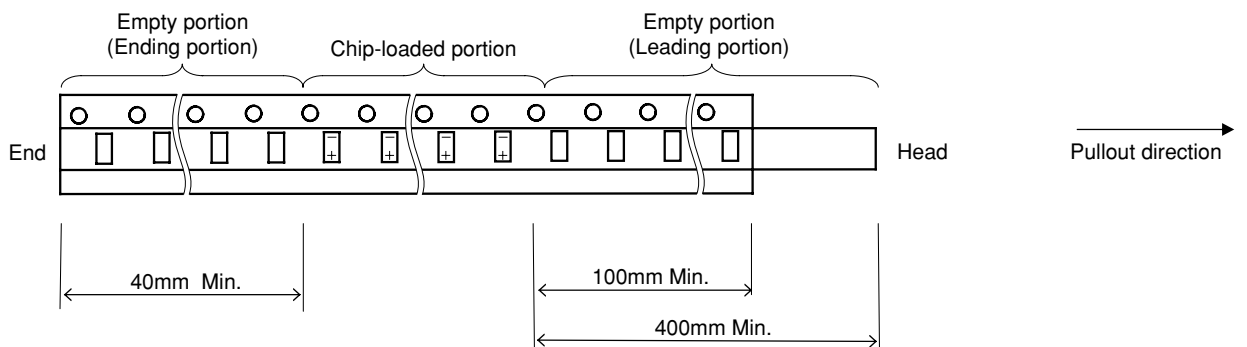


■ Component insertion on reel

It is required that the number of empty places in the tape per reel shall not exceed 0.1% without consecutive empty places.

■ Packing method

- Polarity: Anode on the opposite side of the feed hole. (for the polarity code R only.) The bottom of lead is toward the emboss pocket. upper marking side is faced to the top cover tape.
- The leader length of the tape shall not be less than 400mm including 10mm or more embossed sections in which no parts are contained.
- The winding core is provided with an over 40mm long empty section.



### Outside dimensions

EIA code	Size code	L±0.1	W±0.1	H±0.1	W2±0.1	a±0.15
1608	J	1.6	0.8	0.8	0.6	0.3

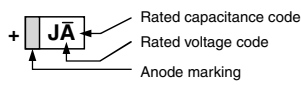
  

EIA code	Size code	L±0.2	W±0.2	H±0.2	W2±0.2	a±0.3
2012	P	2.0	1.25	1.2(max.)	0.9	0.5
3216L	A2	3.2	1.6	1.2(max.)	1.2	0.8
3216	A	3.2	1.6	1.6	1.2	0.8
3528	B	3.4	2.8	1.9	2.2	0.8
6032	C	6.0	3.2	2.5	2.2	1.3
7343	D0	7.3	4.3	2.8	2.4	1.3

### Printed markings

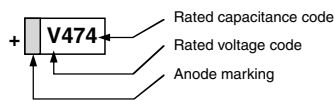
#### SYF. SKY. SYL Series

##### J. P size



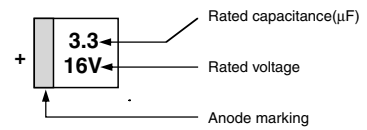
Ex. 6.3V 10µF

##### A. A2 size



Ex. 35V 0.47µF

##### B.C.D0 size



Ex. 16V 3.3µF

Rated voltage 2.5V is marked "2V".  
Rated voltage 6.3V is marked "6V".

#### Rated voltage code

Rated voltage(V)	2.5	4	6.3	10	16	20	25	35
Rated voltage code	e	G	J	A	C	D	E	V

#### List of capacitance marking (J, P, A2, A size)

Series name	Rated capacitance code		
	SYF		SYF/SKY
Rated capacitance (µF)	J Size	P Size	A2, A Size
0.1	A	Δ	104
0.15	E	Ε	154
0.22	J	J	224
0.33	N	N	334
0.47	S	S	474
0.68	W	W	684
1	A	A	105
1.5	E	E	155
2.2	J	J	225
3.3	N	N	335
4.7	S	S	475
6.8	W	W	685

Series name	Rated capacitance code		
	SYF		SYF/SKY
Rated capacitance (µF)	J Size	P Size	A2, A Size
10	A	Δ	106
15	E	Ε	156
22	J	J	226
33	-	-	336
47	-	-	476
68	-	-	686
100	-	-	107

### Part No. system

Example: Type SY6: 16V. 10µF: A size

**Rated voltage code**

Rated voltage (V)	0E	0G	0J	1A	1C	1D	1E	1V
Rated voltage code	2.5	4	6.3	10	16	20	25	35

**Rated capacitance code**

The 1st and 2nd numeric characters denote significant figures, and the 3rd numeric character the number of zero's placed after the significant figures denoting capacitance in pF. (Exponential of ten)

Example

Rated capacitance	Rated capacitance code
47x10 <sup>4</sup> pF=0.47µF	474
10x10 <sup>5</sup> pF=1.0µF	105
22x10 <sup>5</sup> pF=2.2µF	225

**Taping polarity code (R only)**

Polarity	Taping polarity code
	R

Pullout direction

**Additional code**  
Not entered for a standard type

**Capacitance tolerance**

Rated capacitance tolerance code	Rated capacitance tolerance
K	±10%
M	±20%

Lowprofile Hight type capacitors Lowprofile Hight:1.2mm Max.

GREEN CAP SMD

Specifications

Item		Performance		
Category temperature range (°C)		-55 to +125 (Above 85°C use category voltage)		
Leakage current (µA)		Refer to standard ratings table		
Tolerance at rated capacitance (%)		±10% (Except J size), ±20% (120Hz)		
Tangent of loss angle		Refer to standard ratings table (120Hz)		
ESR		Refer to standard ratings table (100kHz)		
Resistance to soldering heat		Test conditions: Soaking at 260°C for 5 seconds		
			J Size	P,A2 Size
		Leakage current	The initial specified value or less	The initial specified value or less
		Percentage of capacitance change	Within ±20% of initial value	Within ±10% of initial value
Characteristics at high and low temperature		-55°C		
		Percentage of capacitance change	Within -20 to 0% of the initial value	Within -10 to 0% of the initial value
		Tangent of loss angle	Refer to standard rating table	Refer to standard rating table
		+85°C		
		Leakage current	1000% or less of the initial specified value	1000% or less of the initial specified value
		Percentage of capacitance change	Within 0 to 15% of the initial value	Within 0 to 10% of the initial value
Damp heat, steady state (Humidity)		Test conditions: Left at 40°C under 90 to 95% RH for 500 hours		
		Leakage current	The initial specified value or less	The initial specified value or less
		Percentage of capacitance change	Within ±20% of initial value	Within ±10% of initial value
		Tangent of loss angle	200% or less of the initial specified value	150% or less of the initial specified value
Endurance (Load life)		Test conditions: Rated voltage applied at 85°C for 2000 hours;		
		Leakage current	The initial specified value or less	The initial specified value or less
		Percentage of capacitance change	Within ±20% of the initial value	Within ±10% of the initial value
		Tangent of loss angle	200% or less of the initial specified value	150% or less of the initial specified value
Failure rate		Less than 1% / 1000 hour (Refer to TECHNICAL NOTE)		
Others		Conforms to IEC 60384-3 : 1989 (JIS C5101-3 : 1998)		

\* Relation between the rated and the 125°C category voltage.

Rated voltage(V)	2.5	4	6.3	10	16	20	25
105°C category voltage(V)	1.6	2.5	4	6.3	10	13	16

Dimension table

Rated capacitance (µF)	Rated capacitance code	2.5V e	4V G	6.3V J	10V A	16V C	20V D	25V E
0.1	104						A2	
0.15	154						A2	
0.22	224						A2	
0.33	334					P	A2	
0.47	474					P	A2	A2
0.68	684				P	P	A2	A2
1	105				P A2	J P	A2	A2
1.5	155			P A2	J P A2	P	A2	
2.2	225		A2	J P A2	J P A2	P A2	A2	
3.3	335		P A2	J P A2	J P A2	A2		
4.7	475	J A2	J P A2	J P A2	J P A2	A2		
6.8	685	J A2	J P A2	J P A2	J P A2	P A2		
10	106	J A2	J P A2	J P A2	P A2			
15	156		P A2	P A2	A2			
22	226		P A2	A2				
33	336	P A2	A2	A2				
47	476		A2					
68	686							

Tantalum Chip Capacitors

### Lowprofile Hight type capacitors Lowprofile Hight:1.2mm Max.

#### Standard ratings

Rated voltage (V)	Rated capacitance (μF) (120Hz)	Marking	EIA size code	ELNA size code	Leakage current (μA, or less)	Tangent of the loss angle (less)(120Hz)				E.S.R. (Ω) (100kHz)	ELNA Part No.	Taping minimum packing pcs. (pcs/reel)	Note
						-55°C	20°C	85°C	125°C				
2.5	4.7	eS	1608	J	0.50	0.30	0.20	0.25	0.30	10.0	SYF-0E475M-RJ	4,000	
	4.7	e475	3216L	A2	0.50	0.12	0.08	0.10	0.12	8.0	SYF-0E475M-RA2	3,000	*
	6.8	eW	1608	J	0.50	0.30	0.20	0.25	0.30	10.0	SYF-0E685M-RJ	4,000	
	6.8	e685	3216L	A2	0.50	0.12	0.08	0.10	0.12	8.0	SYF-0E685M-RA2	3,000	*
	10	eA	1608	J	0.50	0.30	0.20	0.25	0.30	10.0	SYF-0E106M-RJ	4,000	
	10	e106	3216L	A2	0.50	0.12	0.08	0.10	0.12	4.0	SYF-0E106M-RA2	3,000	*
	15	e156	3216L	A2	0.50	0.18	0.12	0.16	0.18	4.0	SYF-0E156M-RA2	3,000	*
	22	e226	3216L	A2	0.55	0.18	0.12	0.16	0.18	4.0	SYF-0E226M-RA2	3,000	*
	33	eN	2012	P	0.82	0.12	0.08	0.10	0.12	4.0	SYF-0E336M-RP	3,000	
	33	e336	3216L	A2	0.82	0.18	0.12	0.16	0.18	4.0	SYF-0E336M-RA2	3,000	
	47	e476	3216L	A2	1.17	0.18	0.12	0.16	0.18	4.0	SYF-0E476M-RA2	3,000	
4	2.2	G225	3216L	A2	0.50	0.12	0.08	0.10	0.12	8.0	SYF-0G225M-RA2	3,000	*
	3.3	GN	2012	P	0.50	0.12	0.08	0.10	0.12	10.0	SYF-0G335M-RP	3,000	*
	3.3	G335	3216L	A2	0.50	0.12	0.08	0.10	0.12	8.0	SYF-0G335M-RA2	3,000	*
	4.7	GS	1608	J	0.50	0.30	0.20	0.25	0.30	10.0	SYF00G475M-RJ	4,000	
	4.7	GS	2012	P	0.50	0.12	0.08	0.10	0.12	5.5	SYF-0G475M-RP	3,000	*
	4.7	G475	3216L	A2	0.50	0.12	0.08	0.10	0.12	5.0	SYF-0G475M-RA2	3,000	*
	6.8	GW	1608	J	0.50	0.30	0.20	0.25	0.30	10.0	SYF-0G685M-RJ	4,000	
	6.8	GW	2012	P	0.50	0.12	0.08	0.10	0.12	5.5	SYF-0G685M-RP	3,000	*
	6.8	G685	3216L	A2	0.50	0.12	0.08	0.10	0.12	4.0	SYF-0G685M-RA2	3,000	*
	10	GA	1608	J	0.50	0.30	0.20	0.25	0.30	10.0	SYF-0G106M-RJ	4,000	
	10	GA	2012	P	0.50	0.15	0.10	0.12	0.15	5.5	SYF-0G106M-RP	3,000	
	10	G106	3216L	A2	0.50	0.15	0.10	0.13	0.15	4.0	SYF-0G106M-RA2	3,000	
	15	GE	2012	P	0.60	0.15	0.10	0.12	0.15	4.5	SYF-0G156M-RP	3,000	
	15	G156	3216L	A2	0.60	0.15	0.10	0.13	0.15	4.0	SYF-0G156M-RA2	3,000	
	22	GJ	2012	P	0.88	0.15	0.10	0.12	0.15	4.5	SYF-0G226M-RP	3,000	
	22	G226	3216L	A2	0.88	0.18	0.12	0.16	0.18	2.8	SYF-0G226M-RA2	3,000	
	33	G336	3216L	A2	1.32	0.18	0.12	0.16	0.18	2.8	SYF-0G336M-RA2	3,000	
	47	G476	3216L	A2	1.88	0.24	0.16	0.19	0.24	2.8	SYF-0G476M-RA2	3,000	
6.3	1.5	JE	2012	P	0.50	0.12	0.08	0.10	0.12	10.0	SYF-0J155M-RP	3,000	
	1.5	J155	3216L	A2	0.50	0.12	0.08	0.10	0.12	8.0	SYF-0J155M-RA2	3,000	
	2.2	JJ	1608	J	0.50	0.30	0.20	0.25	0.30	10.0	SYF-0J225M-RJ	4,000	
	2.2	JJ	2012	P	0.50	0.12	0.08	0.10	0.12	10.0	SYF-0J225M-RP	3,000	
	2.2	J225	3216L	A2	0.50	0.12	0.08	0.10	0.12	8.0	SYF-0J225M-RA2	3,000	
	3.3	JN	1608	J	0.50	0.30	0.20	0.25	0.30	10.0	SYF-0J335M-RJ	4,000	
	3.3	JN	2012	P	0.50	0.12	0.08	0.10	0.12	10.0	SYF-0J335M-RP	3,000	
	3.3	J335	3216L	A2	0.50	0.12	0.08	0.10	0.12	8.0	SYF-0J335M-RA2	3,000	
	4.7	JS	1608	J	0.50	0.30	0.20	0.25	0.30	8.5	SYF-0J475M-RJ	4,000	
	4.7	JS	2012	P	0.50	0.12	0.08	0.10	0.12	6.0	SYF-0J475M-RP	3,000	
	4.7	J475	3216L	A2	0.50	0.12	0.08	0.10	0.12	4.0	SYF-0J475M-RA2	3,000	
	6.8	JW	1608	J	0.50	0.30	0.20	0.25	0.30	8.0	SYF-0J685M-RJ	4,000	
	6.8	JW	2012	P	0.50	0.12	0.08	0.10	0.12	6.0	SYF-0J685M-RP	3,000	
	6.8	J685	3216L	A2	0.50	0.15	0.10	0.13	0.15	4.0	SYF-0J685M-RA2	3,000	
	10	JA	1608	J	6.30	0.30	0.20	0.25	0.30	8.0	SYF-0J106M-RJ	4,000	
	10	JA	2012	P	0.63	0.15	0.10	0.12	0.15	6.0	SYF-0J106M-RP	3,000	
	10	J106	3216L	A2	0.63	0.12	0.08	0.10	0.12	4.0	SYF-0J106M-RA2	3,000	
	15	JE	2012	P	0.94	0.24	0.16	0.19	0.24	5.0	SYF-0J156M-RP	3,000	
	15	J156	3216L	A2	0.94	0.18	0.12	0.16	0.18	4.0	SYF-0J156M-RA2	3,000	
	22	J226	3216L	A2	1.38	0.21	0.14	0.18	0.21	2.8	SYF-0J226M-RP	3,000	
33	J336	3216L	A2	2.07	0.24	0.16	0.19	0.24	2.8	SYF-0J336M-RA2	3,000		

The asterisk in the Note row indicates the reduced frequency of manufacture due to miniaturization, etc. For new design, it is recommended to choose a smaller product with a higher voltage and same capacity.

**NOTE**  
Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.



Lowprofile Hight type capacitors Lowprofile Hight:1.2mm Max.

Standard ratings

Rated voltage (V)	Rated capacitance (µF) (120Hz)	Marking	EIA size code	ELNA size code	Leakage current (µA, or less)	Tangent of the loss angle (less)(120Hz)				E.S.R. (Ω) (100kHz)	ELNA Part No.	Taping minimum packing pcs. (pcs/reel)	Note
						-55°C	20°C	85°C	125°C				
10	0.68	AW	2012	P	0.50	0.12	0.08	0.10	0.12	28.0	SYF-1A684M-RP	3,000	
	1	AA	2012	P	0.50	0.12	0.08	0.10	0.12	10.0	SYF-1A105M-RP	3,000	
	1	A105	3216L	A2	0.50	0.09	0.06	0.08	0.09	8.0	SYF-1A105M-RA2	3,000	
	1.5	AE	1608	J	0.50	0.30	0.20	0.25	0.30	10.0	SYF-1A155M-RJ	4,000	
	1.5	AE	2012	P	0.50	0.12	0.08	0.10	0.12	10.0	SYF-1A155M-RP	3,000	
	1.5	A155	3216L	A2	0.50	0.12	0.08	0.10	0.12	8.0	SYF-1A155M-RA2	3,000	
	2.2	AJ	1608	J	0.50	0.30	0.20	0.25	0.30	13.0	SYF-1A225M-RJ	4,000	
	2.2	AJ	2012	P	0.50	0.12	0.08	0.10	0.12	10.0	SYF-1A225M-RP	3,000	
	2.2	A225	3216L	A2	0.50	0.12	0.08	0.10	0.12	8.0	SYF-1A225M-RA2	3,000	
	3.3	AN	1608	J	0.50	0.30	0.20	0.25	0.30	10.0	SYF-1A335M-RJ	4,000	
	3.3	AN	2012	P	0.50	0.12	0.08	0.10	0.12	10.0	SYF-1A335M-RP	3,000	
	3.3	A335	3216L	A2	0.50	0.12	0.08	0.10	0.12	8.0	SYF-1A335M-RA2	3,000	
	4.7	AS	1608	J	4.70	0.30	0.20	0.25	0.30	10.0	SYF-1A475M-RJ	4,000	
	4.7	AS	2012	P	0.50	0.12	0.08	0.10	0.12	6.0	SYF-1A475M-RP	3,000	
	4.7	A475	3216L	A2	0.50	0.12	0.08	0.10	0.12	4.0	SYF-1A475M-RA2	3,000	
	6.8	AW	2012	P	0.68	0.15	0.10	0.13	0.15	6.0	SYF-1A685M-RP	3,000	
6.8	A685	3216L	A2	0.68	0.12	0.08	0.10	0.12	4.0	SYF-1A685M-RA2	3,000		
10	AA	2012	P	1.00	0.21	0.14	0.18	0.21	6.0	SYF-1A106M-RP	3,000		
10	A106	3216L	A2	1.00	0.12	0.08	0.10	0.12	4.0	SYF-1A106M-RA2	3,000		
15	A156	3216L	A2	1.50	0.24	0.12	0.15	0.25	4.0	SYF-1A156M-RA2	3,000		
16	0.33	CN	2012	P	0.50	0.09	0.06	0.07	0.09	28.0	SYF-1C334M-RP	3,000	
	0.47	CS	2012	P	0.50	0.09	0.06	0.07	0.09	28.0	SYF-1C474M-RP	3,000	
	0.68	CW	2012	P	0.50	0.09	0.06	0.07	0.09	28.0	SYF-1C684M-RP	3,000	
	1	CA	1608	J	0.50	0.30	0.20	0.25	0.30	10.0	SYF-1C105M-RJ	4,000	
	1	CA	2012	P	0.50	0.09	0.06	0.07	0.09	25.0	SYF-1C105M-RP	3,000	
	1.5	CE	2012	P	0.50	0.12	0.08	0.10	0.12	20.0	SYF-1C155M-RP	3,000	
	2.2	CJ	2012	P	0.50	0.12	0.08	0.10	0.12	20.0	SYF-1C225M-RP	3,000	
	2.2	C225	3216L	A2	0.50	0.09	0.06	0.08	0.09	8.0	SYF-1C225M-RA2	3,000	
	3.3	C335	3216L	A2	0.50	0.09	0.06	0.08	0.09	6.0	SYF-1C335M-RA2	3,000	
4.7	C475	3216L	A2	0.75	0.09	0.06	0.08	0.09	6.0	SYF-1C475M-RA2	3,000		
20	0.1	D104	3216L	A2	0.50	0.09	0.06	0.08	0.09	28.0	SYF-1D104M-RA2	3,000	
	0.15	D154	3216L	A2	0.50	0.09	0.06	0.08	0.09	25.0	SYF-1D154M-RA2	3,000	
	0.22	D224	3216L	A2	0.50	0.09	0.06	0.08	0.09	23.0	SYF-1D224M-RA2	3,000	
	0.33	D334	3216L	A2	0.50	0.09	0.06	0.08	0.09	20.0	SYF-1D334M-RA2	3,000	
	0.47	D474	3216L	A2	0.50	0.09	0.06	0.08	0.09	15.0	SYF-1D474M-RA2	3,000	
	0.68	D684	3216L	A2	0.50	0.09	0.06	0.08	0.09	14.0	SYF-1D684M-RA2	3,000	
	1	D105	3216L	A2	0.50	0.09	0.06	0.08	0.09	10.0	SYF-1D105M-RA2	3,000	
	1.5	D155	3216L	A2	0.50	0.09	0.06	0.08	0.09	9.0	SYF-1D155M-RA2	3,000	
2.2	D225	3216L	A2	0.50	0.09	0.06	0.08	0.09	7.0	SYF-1D225M-RA2	3,000		
25	0.47	E474	3216L	A2	0.50	0.09	0.06	0.08	0.09	15.0	SYF-1E474M-RA2	3,000	
	0.68	E684	3216L	A2	0.50	0.09	0.06	0.08	0.09	14.0	SYF-1E684M-RA2	3,000	
	1	E105	3216L	A2	0.50	0.09	0.06	0.08	0.09	13.0	SYF-1E105M-RA2	3,000	

Tantalum Chip Capacitors

### Resin mold chip type capacitors Standard Type

GREEN CAP SMD

#### Specifications

Item		Performance			
Category temperature range (°C)		-55 to +125 (Above 85°C use category voltage)			
Leakage current (μA)		Refer to standard ratings table			
Tolerance at rated capacitance (%)		±10%(Except SY9) , ±20% (120Hz)			
Tangent of loss angle		Refer to standard ratings table (120Hz)			
ESR		Refer to standard ratings table (100kHz)			
Resistance to soldering heat		Test conditions: Soaking at 260°C for 5 seconds			
			SY5,SY6,SY7,SY8,SY9,SYL	SY1,SY2,SY3,SY4	
		Leakage current	The initial specified value or less	The initial specified value or less	
		Percentage of capacitance change	Within ±10% of initial value	Within ±5% of initial value	
Characteristics at high and low temperature		-55°C			
		Percentage of capacitance change	Within -10 to 0% of the initial value	Within -10 to 0% of the initial value	
		Tangent of loss angle	Refer to standard rating table	Refer to standard rating table	
		+85°C			
		Leakage current	1000% or less of the initial specified value	1000% or less of the initial specified value	
		Percentage of capacitance change	Within 0 to 10% of the initial value	Within 0 to 10% of the initial value	
+125°C		Leakage current data have been measured at derated voltage*			
		Leakage current	1250% or less of the initial specified value	1250% or less of the initial specified value	
		Percentage of capacitance change	Within 0 to 12% of the initial value	Within 0 to 12% of the initial value	
		Tangent of loss angle	Refer to standard rating table	Refer to standard rating table	
Damp heat, steady state (Humidity)		Test conditions: Left at 40°C under 90 to 95% RH for 500 hours			
		Leakage current	The initial specified value or less	The initial specified value or less	
		Percentage of capacitance change	Within ±10% of initial value	Within ±5% of initial value	
		Tangent of loss angle	150% or less of the initial specified value	The initial specified value or less	
Endurance (Load life)		Test conditions: Rated voltage applied at 85°C for 2000 hours:			
		Leakage current	The initial specified value or less	The initial specified value or less	
		Percentage of capacitance change	Within ±10% of initial value	Within ±10% of initial value	
		Tangent of loss angle	150% or less of the initial specified value	The initial specified value or less	
Failure rate		Less than 1% / 1000 hour (Refer to TECHNICAL NOTE)			
Others		Conforms to IEC 60384-3 : 1989 (JIS C5101-3 : 1998)			

\* Relation between the rated and the 125°C category voltage.

Rated voltage(V)	2.5	4	6.3	10	16	20	25	35
105°C category voltage(V)	1.6	2.5	4	6.3	10	13	16	22

#### SKY Type Dimension table

Rated capacitance (μF)	Rated capacitance code	2.5V e	4V G	6.3V J	10V A	16V C	20V D	25V E	35V V
0.1	104								A
0.15	154								A
0.22	224								A
0.33	334								A
0.47	474							A	A B
0.68	684							A	A B
1	105					A	A	A	A B
1.5	155				A	A	A	A B	A B C
2.2	225			A	A	A	A B	A B	B C
3.3	335		A	A	A	A B	A B	B	B C
4.7	475		A	A	A B	A B	A B	B C	C D0
6.8	685		A	A B	A B	A B	A B C	B C	C D0
10	106		A B	A B	A B	A B C	B C	C D0	C D0
15	156	A	A B	A B	A B C	B C	C D0	C D0	D0
22	226	A	A B	A B C	A B C	B C D0	C D0	D0	D0
33	336	A	A B C	A B C	B C D0	C D0	D0	D0	
47	476	A	A B C	A B C D0	B C D0	C D0	D0		
68	686	A B	A B C D0	B C D0	C D0	D0			
100	107	A B	B C D0	B C D0	C D0	D0			
150	157	B	B C D0	C D0	D0				
220	227	B	B C D0	D0	D0				
330	337			D0	D0				
470	477			D0					
680	687								

Tantalum Chip Capacitors

Resin mold chip type capacitors Standard Type

Standard ratings

Rated voltage (V)	Rated capacitance (μF) (120Hz)	Marking	EIA size code	ELNA size code	Leakage current (μA, or less)	Tangent of the loss angle (less)(120Hz)				E.S.R. (Ω) (100kHz)	ELNA Part No.	Taping minimum packing pcs. (pcs/reel)	Note
						-55°C	20°C	85°C	125°C				
2.5	15	e156	3216	A	0.50	0.09	0.06	0.08	0.09	4.0	SY3-0E156M-RA	2,000	*
	22	e226	3216	A	0.55	0.12	0.08	0.10	0.12	2.8	SY4-0E226M-RA	2,000	*
	33	e336	3216	A	0.82	0.18	0.08	0.10	0.12	2.5	SY5-0E336M-RA	2,000	
	47	e476	3216	A	1.17	0.18	0.12	0.16	0.18	2.5	SY6-0E476M-RA	2,000	
	68	e686	3216	A	1.70	0.27	0.18	0.23	0.27	2.0	SY7-0E686M-RA	2,000	
	68	---	3528	B	1.70	0.12	0.08	0.10	0.12	1.5	SY5-0E686M-RB	2,000	*
	100	e107	3216	A	2.50	0.27	0.18	0.23	0.27	2.0	SY8-0E107M-RA	2,000	
	100	---	3528	B	2.50	0.12	0.08	0.10	0.12	1.0	SY6-0E107M-RB	2,000	
	150	---	3528	B	3.75	0.18	0.12	0.16	0.18	1.0	SY7-0E157M-RB	2,000	
	220	---	3528	B	5.50	0.27	0.18	0.23	0.27	1.0	SY8-0E157M-RB	2,000	
4	3.3	G335	3216	A	0.50	0.09	0.06	0.07	0.09	8.0	SY1-0G335M-RA	2,000	*
	4.7	G475	3216	A	0.50	0.12	0.08	0.10	0.12	4.0	SY2-0G475M-RA	2,000	
	6.8	G685	3216	A	0.50	0.12	0.08	0.10	0.12	4.0	SY2-0G685M-RA	2,000	
	10	G106	3216	A	0.50	0.12	0.08	0.10	0.12	4.0	SY3-0G106M-RA	2,000	
	10	---	3528	B	0.50	0.09	0.06	0.07	0.09	2.5	SY1-0G106M-RB	2,000	*
	15	G156	3216	A	0.60	0.12	0.08	0.10	0.12	3.0	SY4-0G156M-RA	2,000	
	15	---	3528	B	0.60	0.12	0.08	0.10	0.12	3.5	SY2-0G156M-RB	2,000	*
	22	G226	3216	A	0.88	0.12	0.08	0.10	0.12	2.5	SY5-0G226M-RA	2,000	
	22	---	3528	B	0.88	0.09	0.06	0.08	0.09	1.5	SY3-0G226M-RB	2,000	
	33	G336	3216	A	1.32	0.15	0.10	0.12	0.15	2.5	SY6-0G336M-RA	2,000	
	33	---	3528	B	1.32	0.12	0.08	0.10	0.12	1.5	SY4-0G336M-RB	2,000	
	33	---	6032	C	1.32	0.09	0.06	0.07	0.09	2.2	SY1-0G336M-RC	500	*
	47	G476	3216	A	1.88	0.15	0.10	0.13	0.15	2.5	SY7-0G476M-RA	2,000	
	47	---	3528	B	1.88	0.12	0.08	0.10	0.12	1.5	SY5-0G476M-RB	2,000	
	47	---	6032	C	1.88	0.12	0.06	0.08	0.12	1.0	SY2-0G476M-RC	500	
	68	G686	3216	A	2.72	0.24	0.16	0.19	0.24	2.5	SY8-0G686M-RA	2,000	
	68	---	3528	B	2.72	0.12	0.08	0.10	0.12	1.5	SY6-0G686M-RB	2,000	
	68	---	6032	C	2.72	0.09	0.06	0.08	0.09	1.0	SY3-0G686M-RC	500	
	68	---	7343	D0	2.72	0.09	0.06	0.07	0.09	0.7	SY1-0G686M-RD0	500	
	100	---	3528	B	4.00	0.15	0.10	0.13	0.15	1.0	SY7-0G107M-RB	2,000	
	100	---	6032	C	4.00	0.12	0.08	0.10	0.12	0.8	SY4-0G107M-RC	500	
	100	---	7343	D0	4.00	0.12	0.08	0.10	0.12	0.8	SY2-0G107M-RD0	500	*
	150	---	3528	B	6.00	0.24	0.16	0.19	0.24	1.0	SY8-0G157M-RB	2,000	
	150	---	6032	C	6.00	0.15	0.10	0.13	0.15	0.8	SY5-0G157M-RC	500	
150	---	7343	D0	6.00	0.12	0.08	0.10	0.12	0.8	SY3-0G157M-RD0	500		
220	---	3528	B	88.00	0.27	0.18	0.23	0.27	1.0	SY9-0G227M-RB	2,000		
220	---	6032	C	8.80	0.18	0.12	0.15	0.18	0.7	SY6-0G227M-RC	500		
220	---	7343	D0	8.80	0.12	0.08	0.10	0.12	1.0	SY4-0G227M-RD0	500		
330	---	7343	D0	13.20	0.21	0.14	0.18	0.21	0.7	SY5-0G337M-RD0	500		
470	---	7343	D0	18.80	0.24	0.16	0.21	0.24	0.3	SY6-0G477M-RD0	500		

The asterisk in the Note row indicates the reduced frequency of manufacture due to miniaturization, etc. For new design, it is recommended to choose a smaller product with a higher voltage and same capacity.

## Resin mold chip type capacitors Standard Type

### Standard ratings

Rated voltage (V)	Rated capacitance (μF) (120Hz)	Marking	EIA size code	ELNA size code	Leakage current (μA, or less)	Tangent of the loss angle (less)(120Hz)				E.S.R. (Ω) (100kHz)	ELNA Part No.	Taping minimum packing pcs. (pcs/reel)	Note
						-55°C	20°C	85°C	125°C				
6.3	2.2	J225	3216	A	0.50	0.09	0.06	0.07	0.09	8.0	SY1-0J225M-RA	2,000	*
	3.3	J335	3216	A	0.50	0.09	0.06	0.08	0.09	7.0	SY2-0J335M-RA	2,000	
	4.7	J475	3216	A	0.50	0.09	0.06	0.10	0.09	4.0	SY2-0J475M-RA	2,000	
	6.8	J685	3216	A	0.50	0.09	0.06	0.08	0.09	3.5	SY3-0J685M-RA	2,000	
	6.8	---	3528	B	0.50	0.09	0.06	0.07	0.09	3.0	SY1-0J685M-RB	2,000	*
	10	J106	3216	A	0.63	0.12	0.08	0.10	0.12	3.0	SY4-0J106M-RA	2,000	
	10	---	3528	B	0.63	0.09	0.06	0.08	0.09	3.0	SY2-0J106M-RB	2,000	
	15	J156	3216	A	0.94	0.12	0.08	0.10	0.12	3.0	SY5-0J156M-RA	2,000	
	15	---	3528	B	0.94	0.09	0.06	0.08	0.09	2.0	SY3-0J156M-RB	2,000	
	22	J226	3216	A	1.38	0.15	0.10	0.13	0.15	2.5	SY6-0J226M-RA	2,000	
	22	---	3528	B	1.38	0.12	0.08	0.10	0.12	1.5	SY4-0J226M-RB	2,000	
	22	---	6032	C	1.38	0.09	0.06	0.07	0.09	1.0	SY1-0J226M-RC	500	*
	33	J336	3216	A	2.07	0.15	0.10	0.13	0.15	2.5	SY7-0J336M-RA	2,000	
	33	---	3528	B	2.07	0.12	0.08	0.10	0.12	1.5	SY5-0J336M-RB	2,000	
	33	---	6032	C	2.07	0.09	0.06	0.08	0.09	1.0	SY2-0J336M-RC	500	
	47	J476	3216	A	2.96	0.24	0.16	0.19	0.24	2.5	SY8-0J476M-RA	2,000	
	47	---	3528	B	2.96	0.15	0.10	0.13	0.15	1.0	SY6-0J476M-RB	2,000	
	47	---	6032	C	2.96	0.09	0.06	0.08	0.09	1.0	SY3-0J476M-RC	500	
	47	---	7343	D0	2.96	0.09	0.06	0.07	0.09	0.7	SY1-0J476M-RD0	500	*
	68	---	3528	B	4.28	0.15	0.10	0.13	0.15	1.0	SY7-0J686M-RB	2,000	
	68	---	6032	C	4.28	0.12	0.08	0.10	0.12	0.8	SY4-0J686M-RC	500	
	68	---	7343	D0	4.28	0.09	0.06	0.08	0.09	0.8	SY2-0J686M-RD0	500	*
	100	---	3528	B	6.30	0.18	0.12	0.15	0.18	1.0	SY8-0J107M-RB	2,000	
	100	---	6032	C	6.30	0.15	0.10	0.13	0.15	0.7	SY5-0J107M-RC	500	
	100	---	7343	D0	6.30	0.12	0.08	0.10	0.12	0.8	SY3-0J107M-RD0	500	
	150	---	6032	C	9.45	0.18	0.12	0.15	0.18	0.7	SY6-0J157M-RC	500	
	150	---	7343	D0	9.45	0.12	0.08	0.10	0.12	1.0	SY4-0J157M-RD0	500	
	220	---	7343	D0	13.86	0.18	0.12	0.16	0.18	0.5	SY5-0J227M-RD0	500	
330	---	7343	D0	20.79	0.24	0.16	0.20	0.24	0.5	SY6-0J337M-RD0	500		
10	1.5	A155	3216	A	0.50	0.09	0.06	0.07	0.09	8.0	SY1-1A155M-RA	2,000	*
	2.2	A225	3216	A	0.50	0.09	0.06	0.08	0.09	7.0	SY2-1A225M-RA	2,000	
	3.3	A335	3216	A	0.50	0.09	0.06	0.08	0.09	5.0	SY2-1A335M-RA	2,000	
	4.7	A475	3216	A	0.50	0.09	0.06	0.08	0.09	4.5	SY3-1A475M-RA	2,000	
	4.7	---	3528	B	0.50	0.09	0.06	0.07	0.09	3.0	SY1-1A475M-RB	2,000	*
	6.8	A685	3216	A	0.68	0.09	0.06	0.08	0.09	3.0	SY4-1A685M-RA	2,000	
	6.8	---	3528	B	0.68	0.09	0.06	0.08	0.09	3.0	SY2-1A685M-RB	2,000	*
	10	A106	3216	A	1.00	0.12	0.08	0.10	0.12	3.0	SY5-1A106M-RA	2,000	
	10	---	3528	B	1.00	0.09	0.06	0.08	0.09	2.0	SY3-1A106M-RB	2,000	
	15	A156	3216	A	1.50	0.15	0.10	0.13	0.15	3.0	SY6-1A156M-RA	2,000	
	15	---	3528	B	1.50	0.09	0.06	0.08	0.09	2.0	SY4-1A156M-RB	2,000	
	15	---	6032	C	1.50	0.09	0.06	0.07	0.09	1.0	SY1-1A156M-RC	500	*
	22	A226	3216	A	2.20	0.18	0.12	0.16	0.18	2.5	SY7-1A226M-RA	2,000	
	22	---	3528	B	2.20	0.12	0.08	0.10	0.12	2.0	SY5-1A226M-RB	2,000	
	22	---	6032	C	2.20	0.09	0.06	0.08	0.09	1.0	SY2-1A226M-RC	500	
	33	---	3528	B	3.30	0.12	0.08	0.10	0.12	1.5	SY6-1A336M-RB	2,000	
	33	---	6032	C	3.30	0.09	0.06	0.08	0.09	1.0	SY3-1A336M-RC	500	
	33	---	7343	D0	3.30	0.09	0.06	0.07	0.09	0.7	SY1-1A336M-RD0	500	*
	47	---	3528	B	4.70	0.15	0.10	0.13	0.15	1.0	SY7-1A476M-RB	2,000	
	47	---	6032	C	4.70	0.09	0.06	0.08	0.09	0.9	SY4-1A476M-RC	500	
	47	---	7343	D0	4.70	0.09	0.06	0.08	0.09	0.8	SY2-1A476M-RD0	500	
	68	---	6032	C	6.80	0.12	0.08	0.10	0.12	0.8	SY5-1A686M-RC	500	
	68	---	7343	D0	6.80	0.09	0.06	0.08	0.09	0.6	SY3-1A686M-RD0	500	
	100	---	6032	C	10.00	0.15	0.10	0.13	0.15	0.7	SY6-1A107M-RC	500	
	100	---	7343	D0	10.00	0.12	0.08	0.10	0.12	0.6	SY4-1A107M-RD0	500	
	150	---	7343	D0	15.00	0.15	0.10	0.13	0.15	0.7	SY5-1A157M-RD0	500	

The asterisk in the Note row indicates the reduced frequency of manufacture due to miniaturization, etc.  
For new design, it is recommended to choose a smaller product with a higher voltage and same capacity.

**NOTE**  
Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

Resin mold chip type capacitors Standard Type

Standard ratings

Rated voltage (V)	Rated capacitance (μF) (120Hz)	Marking	EIA size code	ELNA size code	Leakage current (μA, or less)	Tangent of the loss angle (less)(120Hz)				E.S.R. (Ω) (100kHz)	ELNA Part No.	Taping minimum packing pcs. (pcs/reel)	Note
						-55°C	20°C	85°C	125°C				
16	1	C105	3216	A	0.50	0.09	0.05	0.07	0.09	7.0	SY1-1C105M-RA	2,000	
	1.5	C155	3216	A	0.50	0.09	0.06	0.08	0.09	7.0	SY2-1C155M-RA	2,000	
	2.2	C225	3216	A	0.50	0.09	0.06	0.08	0.09	5.0	SY2-1C225M-RA	2,000	
	3.3	C335	3216	A	0.50	0.09	0.06	0.08	0.09	4.5	SY3-1C335M-RA	2,000	
	3.3	---	3528	B	0.50	0.09	0.06	0.07	0.09	3.0	SY1-1C335M-RB	2,000	*
	4.7	C475	3216	A	0.75	0.09	0.06	0.08	0.09	4.0	SY4-1C475M-RA	2,000	
	4.7	---	3528	B	0.75	0.09	0.06	0.08	0.09	3.0	SY2-1C475M-RB	2,000	*
	6.8	C685	3216	A	1.08	0.12	0.08	0.10	0.12	3.5	SY5-1C685M-RA	2,000	
	6.8	---	3528	B	1.08	0.09	0.06	0.08	0.09	2.5	SY3-1C685M-RB	2,000	
	10	C106	3216	A	1.60	0.12	0.08	0.10	0.12	4.0	SY6-1C106M-RA	2,000	
	10	---	3528	B	1.60	0.09	0.06	0.08	0.09	2.0	SY4-1C106M-RB	2,000	
	10	---	6032	C	1.60	0.09	0.06	0.07	0.09	2.2	SY1-1C106M-RC	500	*
	15	---	3528	B	2.40	0.09	0.06	0.08	0.09	2.0	SY5-1C156M-RB	2,000	
	15	---	6032	C	2.40	0.09	0.06	0.08	0.09	2.0	SY2-1C156M-RC	500	*
	22	---	3528	B	3.52	0.12	0.06	0.10	0.12	2.0	SY6-1C226M-RB	2,000	
	22	---	6032	C	3.52	0.09	0.06	0.08	0.09	1.0	SY3-1C226M-RC	500	
	22	---	7343	D0	3.52	0.09	0.06	0.07	0.09	0.7	SY1-1C226M-RD0	500	*
	33	---	6032	C	5.28	0.09	0.06	0.08	0.09	1.1	SY4-1C336M-RC	500	
	33	---	7343	D0	5.28	0.09	0.06	0.08	0.09	1.0	SY2-1C336M-RD0	500	*
	47	---	6032	C	7.52	0.12	0.08	0.10	0.12	0.8	SY5-1C476M-RC	500	
47	---	7343	D0	7.52	0.09	0.06	0.08	0.09	0.7	SY3-1C476M-RD0	500		
68	---	7343	D0	10.80	0.09	0.06	0.08	0.09	0.6	SY4-1C686M-RD0	500		
100	---	7343	D0	16.00	0.15	0.10	0.13	0.15	0.6	SY5-1C107M-RD0	500		
20	0.68	D684	3216	A	0.50	0.09	0.05	0.06	0.09	10.0	SY1-1D684M-RA	2,000	*
	1	D105	3216	A	0.50	0.09	0.05	0.06	0.09	7.5	SY2-1D105M-RA	2,000	
	1.5	D155	3216	A	0.50	0.09	0.06	0.08	0.09	6.0	SY2-1D155M-RA	2,000	
	2.2	D225	3216	A	0.50	0.09	0.06	0.08	0.09	5.0	SY3-1D225M-RA	2,000	
	2.2	---	3528	B	0.50	0.09	0.06	0.07	0.09	5.0	SY1-1D225M-RB	2,000	*
	3.3	D335	3216	A	0.66	0.09	0.06	0.08	0.09	4.0	SY4-1D335M-RA	2,000	
	3.3	---	3528	B	0.66	0.09	0.06	0.08	0.09	3.8	SY2-1D335M-RB	2,000	
	4.7	D475	3216	A	0.94	0.09	0.06	0.08	0.09	4.0	SY5-1D475M-RA	2,000	
	4.7	---	3528	B	0.94	0.09	0.06	0.08	0.09	3.0	SY3-1D475M-RB	2,000	
	6.8	D685	3216	A	1.36	0.12	0.08	0.10	0.12	4.0	SY6-1D685M-RA	2,000	
	6.8	---	3528	B	1.36	0.09	0.06	0.08	0.09	3.0	SY4-1D685M-RB	2,000	
	6.8	---	6032	C	1.36	0.09	0.06	0.07	0.09	2.5	SY1-1D685M-RC	500	*
	10	---	3528	B	2.00	0.09	0.06	0.08	0.09	2.0	SY5-1D106M-RB	2,000	
	10	---	6032	C	2.00	0.09	0.06	0.08	0.09	2.5	SY2-1D106M-RC	500	
	15	---	6032	C	3.00	0.09	0.06	0.08	0.09	1.7	SY3-1D156M-RC	500	
	15	---	7343	D0	3.00	0.09	0.06	0.07	0.09	2.0	SY1-1D156M-RD0	500	*
	22	---	6032	C	4.40	0.09	0.06	0.08	0.09	1.5	SY4-1D226M-RC	500	
	22	---	7343	D0	4.40	0.09	0.06	0.08	0.09	0.8	SY2-1D226M-RD0	500	
33	---	7343	D0	6.60	0.09	0.06	0.08	0.09	0.7	SY3-1D336M-RD0	500		
47	---	7343	D0	9.40	0.09	0.06	0.08	0.09	0.7	SY4-1D476M-RD0	500		

The asterisk in the Note row indicates the reduced frequency of manufacture due to miniaturization, etc. For new design, it is recommended to choose a smaller product with a higher voltage and same capacity.

## Resin mold chip type capacitors Standard Type

### Standard ratings

Rated voltage (V)	Rated capacitance (μF) (120Hz)	Marking	EIA size code	ELNA size code	Leakage current (μA, or less)	Tangent of the loss angle (less)(120Hz)				E.S.R. (Ω) (100kHz)	ELNA Part No.	Taping minimum packing pcs. (pcs/reel)	Note
						-55°C	20°C	85°C	125°C				
25	0.47	E474	3216	A	0.50	0.09	0.05	0.06	0.09	10.0	SY1-1E474M-RA	2,000	*
	0.68	E684	3216	A	0.50	0.09	0.05	0.06	0.09	9.0	SY2-1E684M-RA	2,000	
	1	E105	3216	A	0.50	0.09	0.06	0.08	0.09	7.0	SY2-1E105M-RA	2,000	
	1.5	E155	3216	A	0.50	0.09	0.06	0.08	0.09	6.5	SY3-1E155M-RA	2,000	
	1.5	---	3528	B	0.50	0.09	0.06	0.07	0.09	5.0	SY1-1E155M-RB	2,000	
	2.2	E225	3216	A	0.55	0.09	0.06	0.08	0.09	6.0	SY4-1E225M-RA	2,000	
	2.2	---	3528	B	0.55	0.09	0.06	0.08	0.09	5.0	SY2-1E225M-RB	2,000	
	3.3	---	3528	B	0.82	0.09	0.06	0.08	0.09	4.0	SY3-1E335M-RB	2,000	
	4.7	---	3528	B	1.17	0.09	0.06	0.08	0.09	3.5	SY4-1E475M-RB	2,000	
	4.7	---	6032	C	1.17	0.09	0.06	0.07	0.09	2.5	SY1-1E475M-RC	500	
	6.8	---	3528	B	1.70	0.12	0.08	0.10	0.12	2.0	SY5-1E685M-RB	2,000	
	6.8	---	6032	C	1.70	0.09	0.06	0.08	0.09	2.0	SY2-1E685M-RC	500	
	10	---	6032	C	2.50	0.09	0.06	0.08	0.09	1.5	SY3-1E106M-RC	500	
	10	---	7343	D0	2.50	0.09	0.06	0.07	0.09	1.2	SY1-1E106M-RD0	500	
	15	---	6032	C	3.75	0.09	0.06	0.06	0.09	1.0	SY4-1E156M-RC	500	
	15	---	7343	D0	3.75	0.09	0.06	0.08	0.09	1.0	SY2-1E156M-RD0	500	
22	---	7343	D0	5.50	0.09	0.06	0.08	0.09	0.8	SY3-1E226M-RD0	500		
33	---	7343	D0	8.25	0.09	0.06	0.08	0.09	0.7	SY3-1E226M-RD0	500		
35	0.1	V104	3216	A	0.50	0.09	0.05	0.08	0.09	28.0	SY1-1V104M-RA	2,000	
	0.15	V154	3216	A	0.50	0.09	0.05	0.08	0.09	24.0	SY1-1V154M-RA	2,000	
	0.22	V224	3216	A	0.50	0.09	0.05	0.08	0.09	20.0	SY1-1V224M-RA	2,000	
	0.33	V334	3216	A	0.50	0.09	0.05	0.08	0.09	15.0	SY1-1V334M-RA	2,000	
	0.47	V474	3216	A	0.50	0.09	0.05	0.08	0.09	11.0	SY2-1V474M-RA	2,000	
	0.47	---	3528	B	0.50	0.09	0.04	0.06	0.09	11.0	SY1-1V474M-RB	2,000	
	0.68	V684	3216	A	0.50	0.09	0.04	0.06	0.09	8.0	SY2-1V684M-RA	2,000	
	0.68	---	3528	B	0.50	0.09	0.04	0.06	0.09	8.0	SY1-1V684M-RB	2,000	
	1	V105	3216	A	0.50	0.09	0.06	0.08	0.09	7.0	SY3-1V105M-RA	2,000	
	1	---	3528	B	0.50	0.09	0.04	0.06	0.09	6.0	SY1-1V105M-RB	2,000	
	1.5	V155	3216	A	0.52	0.09	0.06	0.08	0.09	4.0	SY4-1V155M-RA	2,000	
	1.5	---	3528	B	0.52	0.09	0.06	0.08	0.09	5.0	SY2-1V155M-RB	2,000	
	1.5	---	6032	C	0.52	0.09	0.06	0.07	0.09	4.5	SY1-1V155M-RC	500	
	2.2	---	3528	B	0.77	0.09	0.06	0.08	0.09	4.0	SY3-1V225M-RB	2,000	
	2.2	---	6032	C	0.77	0.09	0.06	0.07	0.09	3.5	SY1-1V225M-RC	500	
	3.3	---	3528	B	1.15	0.09	0.06	0.08	0.09	4.0	SY4-1V335M-RB	2,000	
	3.3	---	6032	C	1.15	0.09	0.06	0.07	0.09	3.0	SY1-1V335M-RC	500	
	4.7	---	6032	C	1.64	0.09	0.06	0.08	0.09	2.0	SY2-1V475M-RC	500	
4.7	---	7343	D0	1.64	0.09	0.06	0.07	0.09	1.5	SY1-1V475M-RD0	500		
6.8	---	6032	C	2.38	0.09	0.06	0.08	0.09	1.8	SY3-1V685M-RC	500		
6.8	---	7343	D0	2.38	0.09	0.06	0.07	0.09	1.3	SY1-1V685M-RD0	500		
10	---	6032	C	3.50	0.09	0.06	0.07	0.09	1.5	SY4-1V106M-RC	500		
10	---	7343	D0	3.50	0.09	0.06	0.08	0.09	1.0	SY2-1V106M-RD0	500		
15	---	7343	D0	5.25	0.09	0.06	0.08	0.09	0.8	SY3-1V156M-RD0	500		
22	---	7343	D0	7.70	0.12	0.08	0.10	0.12	0.7	SY4-1V226M-RD0	500		

The asterisk in the Note row indicates the reduced frequency of manufacture due to miniaturization, etc.  
For new design, it is recommended to choose a smaller product with a higher voltage and same capacity.



Resin mold chip type capacitors

GREEN CAP

SMD

Low ESR

Standard ratings Type SYL (LOW ESR)

Rated voltage (V)	Rated capacitance (μF) (120Hz)	Marking (P, A2, A)	EIA size code	ELNA size symbol	Leakage current (μA, or less)	Tangent of the loss angle (less)(120Hz)				E.S.R. (Ω) (100kHz)	Allowable Ripple Current (Arms) (100kHz)	ELNA Part No.	Taping minimum packing pcs. (pcs/reel)	Note	
						-55°C	20°C	85°C	125°C						
4	10	GÄ	2012	P	0.50	0.15	0.1	0.12	0.15	1.2	0.13	SYL-0G106M-RP	3,000		
	22	G226	3216L	A2	0.88	0.18	0.12	0.16	0.18	1.0	0.16	SYL-0G226M-RA2	3,000		
	33	G336	3216L	A2	1.32	0.21	0.14	0.18	0.21	1.0	0.16	SYL-0G336M-RA2	3,000		
	33	G336	3216	A	1.32	0.15	0.1	0.12	0.15	0.8	0.19	SYL-0G336M-RA	2,000		
	47	G476	3216	A	1.88	0.15	0.1	0.13	0.15	0.8	0.19	SYL-0G476M-RA	2,000		
	47	—	3528	B	1.88	0.12	0.08	0.1	0.12	0.8	0.19	SYL-0G476M-RB	2,000		
	100	—	3528	B	4.00	0.15	0.1	0.13	0.15	0.7	0.21	SYL-0G107M-RB	2,000		
	100	—	6032	C	4.00	0.12	0.08	0.1	0.12	0.3	0.41	SYL-0G107M-RC	500		
	220	—	7343	D0	8.80	0.12	0.08	0.1	0.12	0.1	0.87	SYL-0G227M-RD0	500		
	330	—	7343	D0	13.20	0.21	0.14	0.18	0.21	0.1	0.87	SYL-0G337M-RD0	500		
6.3	3.3	JN	2012	P	0.50	0.12	0.08	0.096	0.12	3.0	0.09	SYL-0J335M-RP	3,000		
	4.7	JS	2012	P	0.50	0.12	0.08	0.096	0.12	2.0	0.10	SYL-0J475M-RP	3,000		
	4.7	J475	3216L	A2	0.50	0.12	0.08	0.1	0.12	2.0	0.11	SYL-0J475M-RA2	3,000		
	10	J A	2012	P	0.63	0.15	0.1	0.12	0.15	1.2	0.13	SYL-0J106M-RP	3,000		
	10	J106	3216L	A2	0.63	0.12	0.08	0.1	0.12	1.2	0.14	SYL-0J106M-RA2	3,000		
	10	J106	3216	A	0.63	0.12	0.08	0.1	0.12	1.2	0.16	SYL-0J106M-RA	2,000		
	22	J226	3216	A	1.38	0.15	0.1	0.13	0.15	0.8	0.19	SYL-0J226M-RA	2,000		
	33	J336	3216	A	2.07	0.15	0.1	0.13	0.15	0.8	0.19	SYL-0J336M-RA	2,000		
	33	—	3528	B	2.07	0.12	0.08	0.1	0.12	0.8	0.19	SYL-0J336M-RB	2,000		
	47	—	3528	B	2.96	0.15	0.1	0.13	0.15	1.0	0.17	SYL-0J476M-RB	2,000		
	47	—	6032	C	2.96	0.09	0.06	0.08	0.09	0.4	0.35	SYL-0J476M-RC	500		
	100	—	3528	B	6.30	0.18	0.12	0.15	0.18	0.7	0.21	SYL-0J107M-RB	2,000		
	100	—	6032	C	6.30	0.15	0.1	0.13	0.15	0.25	0.45	SYL-0J107M-RC	500		
	100	—	7343	D0	6.30	0.12	0.08	0.1	0.12	0.15	0.46	SYL-0J107M-RD0	500		
	220	—	7343	D0	13.90	0.18	0.12	0.16	0.18	0.1	0.79	SYL-0J227M-RD0	500		
	10	2.2	A J	2012	P	0.50	0.12	0.08	0.1	0.12	5.0	0.07	SYL-1A225M-RP	3,000	
3.3		A335	3216L	A2	0.50	0.12	0.08	0.1	0.12	3.0	0.09	SYL-1A335M-RA2	3,000		
4.7		A475	3216L	A2	0.50	0.15	0.1	0.13	0.15	2.0	0.11	SYL-1A475M-RA2	3,000		
4.7		A475	3216	A	0.50	0.09	0.06	0.08	0.09	2.0	0.12	SYL-1A475M-RA	2,000		
10		A106	3216L	A2	1.00	0.24	0.16	0.21	0.24	1.5	0.13	SYL-1A106M-RA2	3,000		
10		A106	3216	A	1.00	0.12	0.08	0.1	0.12	1.0	0.15	SYL-1A106M-RA	2,000		
22		—	3528	B	2.20	0.12	0.08	0.1	0.12	1.0	0.17	SYL-1A226M-RB	2,000		
33		—	3528	B	3.30	0.12	0.08	0.1	0.12	0.8	0.19	SYL-1A336M-RB	2,000		
33		—	6032	C	3.30	0.09	0.06	0.08	0.09	0.375	0.37	SYL-1A336M-RC	500		
47		—	3528	B	4.70	0.15	0.1	0.13	0.15	0.7	0.21	SYL-1A476M-RB	2,000		
47		—	6032	C	4.70	0.09	0.06	0.08	0.09	0.4	0.35	SYL-1A476M-RC	500		
47		—	7343	D0	4.70	0.09	0.06	0.08	0.09	0.3	0.50	SYL-1A476M-RD0	500		
100		—	7343	D0	10.00	0.12	0.08	0.1	0.12	0.12	0.79	SYL-1A107M-RD0	500		
150		—	7343	D0	15.00	0.15	0.1	0.13	0.15	0.12	0.79	SYL-1A157M-RD0	500		
16		1	CA	2012	P	0.50	0.09	0.06	0.072	0.09	5.0	0.06	SYL-1C105M-RP	3,000	
		2.2	C J	2012	P	0.50	0.12	0.08	0.096	0.12	5.0	0.06	SYL-1C225M-RP	3,000	
	2.2	C225	3216L	A2	0.50	0.09	0.06	0.08	0.09	4.0	0.08	SYL-1C225M-RA2	3,000		
	3.3	C335	3216L	A2	0.50	0.09	0.06	0.08	0.09	3.0	0.09	SYL-1C335M-RA2	3,000		
	3.3	C335	3216	A	0.50	0.09	0.06	0.08	0.09	1.8	0.13	SYL-1C335M-RA	2,000		
	4.7	C475	3216	A	0.75	0.09	0.06	0.08	0.09	1.8	0.13	SYL-1C475M-RA	2,000		
	4.7	—	3528	B	0.75	0.09	0.06	0.08	0.09	1.8	0.13	SYL-1C475M-RB	2,000		
	10	—	3528	B	1.60	0.09	0.06	0.08	0.09	1.0	0.17	SYL-1C106M-RB	2,000		
	10	—	6032	C	1.60	0.09	0.06	0.08	0.09	0.9	0.24	SYL-1C106M-RC	500		
	22	—	6032	C	3.52	0.09	0.06	0.08	0.09	0.4	0.35	SYL-1C226M-RC	500		
	33	—	6032	C	5.28	0.09	0.06	0.08	0.09	0.4	0.35	SYL-1C336M-RC	500		
	33	—	7343	D0	5.28	0.09	0.06	0.08	0.09	0.25	0.55	SYL-1C336M-RD0	500		
	47	—	7343	D0	7.52	0.09	0.06	0.08	0.09	0.2	0.61	SYL-1C476M-RD0	500		

Tantalum Chip Capacitors

Case size & ESR(Ω)

Rated capacitance (μF)	4V	6.3V	10V	16V
1				P(5.0)
2.2			P(5.0)	P(5.0), A2(4.0)
3.3		P(3.0)	A2(3.0)	A2(3.0), A(1.8)
4.7		P(2.0), A2(2.0)	A2(2.0), A(2.0)	A(1.8), B(1.8)
10	P(1.2)	P(1.2), A2(1.2), A(1.2)	A2(1.5), A(1.0)	B(1.0), C(0.9)
22	A2(1.0)	A(0.8)	B(1.0)	C(0.4)
33	A2(1.0), A(0.8)	A(0.8), B(0.8)	B(0.8), C(0.375)	C(0.4), D0(0.25)
47	A(0.8), B(0.8)	B(1.0), C(0.4)	B(0.7), C(0.4), D0(0.3)	D0(0.2)
100	B(0.7), C(0.3)	B(0.7), C(0.25), D0(0.15)		D0(0.12)
150				D0(0.12)
220				
330	D0(0.1)			

NOTE  
Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

### ■ Structure of a tantalum chip capacitor

To manufacture a tantalum chip capacitor, metallic tantalum(Ta) powder is pressed and formed with a tantalum lead wire, and then sintered in a vacuum; by the electrochemical anodic oxidation, tantalum oxide film ( $Ta_2O_5$ ) is formed on the fired surface; this oxide is used as the dielectric.

On top of the dielectric, a solid manganese dioxide layer( $MnO_2$ ) is formed as the electrolyte through the thermal decomposition of manganese nitrate.

To make an electrical connection on the manganese dioxide layer, a graphite layer and a conductive adhesive are used to fix a cathode lead.

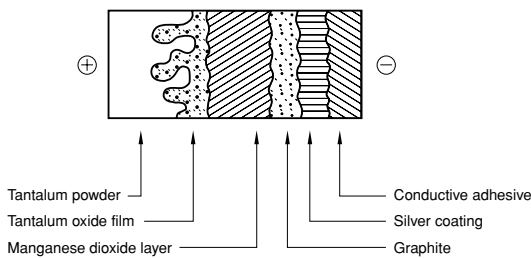


Fig.1 Diagrammatic sketch of a tantalum electrolytic capacitor

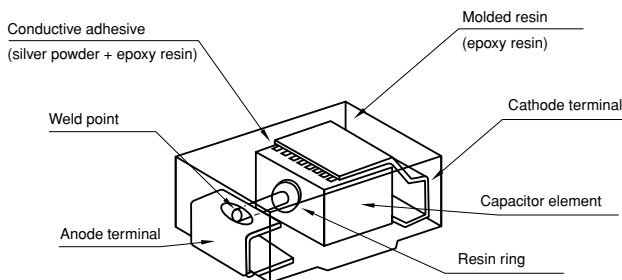


Fig.2 Structure of a tantalum chip capacitor

### ■ Working conditions and reliability (failure rate) of tantalum chip capacitors

Tantalum chip capacitors basically have high temperature resistance and stable electrical characteristics, and is expected to have a long life, because tantalum and tantalum oxidized films are extremely stable, and manganese dioxide serving as a solid electrolyte is also a stable inorganic solid.

On the other side, they tend to have a sudden failure because the tantalum oxidized films serving as an electrolyte are very thin and solid elements.

Consequently, the failure rate curve shows a gradual downturn from the beginning, different from a Bath-tub shaped curve specific to the aluminum electrolytic capacitors.

More than 90% of tantalum chip capacitor failures are caused by increased leakage current or short circuits. Reliability is affected by various conditions for solid tantalum chip capacitors and environmental conditions. These capacitors are particularly affected by ambient temperatures, applied voltage(working voltage), and circuit resistance.

### ■ Ambient temperature, applied voltage(working voltage), and reliability

Reliability (failure rate) of solid tantalum electrolytic capacitors is generally proportional to the powers of temperature and powers of voltage in natural logarithm. An estimated failure rate is expressed by the following formula.

$$\lambda = \lambda_0 \left( \frac{V}{V_0} \right)^n \cdot 2^{\left( \frac{T-T_0}{F} \right)}$$

$\lambda$  : Basic failure rate.

$n$  : Factor for capacitor type.

$F$  : Factor for capacitor type.

$T$  : Working temperature.

$T_0$  : Upper category temperature.

$V$  : Working voltage.

$V_0$  : Rated voltage.

For solid tantalum electrolytic capacitors, it has been confirmed that  $n$  and  $F$  are 3 and 15 respectively on an experimental basis. This easy formula is illustrated in Fig.3.

In the figure;

Vertical lines : Actual failure rate to failure rate  $\lambda_0$ , which is the failure rate at  $T_0=85^\circ C$  and  $V_0$ =Rated voltage

Horizontal lines: Actual working temperature

The parameter of each line [working voltage / rated voltage] shows the voltage reduction factor.

### ■ Series circuit resistance and reliability

A resistance connected with a capacitor reduces the electrical load to the dielectric film of the capacitor. This occurs because it controls the charging and discharging current of the capacitor.

Namely, the greater the series resistance, the greater the electrical load reduction to the dielectric film.

Thus, resulting in higher reliability.

The relationship between a series resistance and reliability (failure rate) is shown in Fig.4.

In the figure;

Vertical lines : Ratio when the failure for  $3\Omega/V$  is assumed to be 1.

Horizontal lines: Resistance value per volt of applied voltage.



## ■ Estimation of the failure rate under actual working conditions

Reliability of electronic parts is generally shown by the failure rate;

$$\text{Failure Rate} = \frac{\text{Number of failure parts}}{\text{Working hours} \times \text{Number of components in operation}} \times 100 \quad (\%/1000 \text{ hours})$$

Note: The unit of working hours to be 1000 hours.

Failure rate setting: For our products, failure rates are set under the following conditions.

Standard conditions for setting the failure rates	
Applied voltage	Rated Voltage
Working temperature	85°C
Circuit resistance	3Ω /V

(A) Failure the setting  
1%/1000 hours(60% reliability level)

Failure rate of actual working time : A prediction of reliability in actual working time can be calculated from coefficients in Fig.3 and Fig.4 and the calculation formula.

Estimated failure rate in actual working time(%/1000 hours)=AxBxC

- A= Set failure rate
- B= Working voltage; Reduction index of temperature (refer to Fig.3)
- C= Circuit resistance coefficient(refer to Fig.4)

Example of calculation: A Type SK 16V10μF capacitor with a capacitance tolerance of ±20% is used under the following conditions:

- Working conditions: Applied voltage: 9.6V;  
Working temperature: 50°C; 0.043 from Fig.3;
- Circuit resistance: 2Ω / V; 1.7 from Fig.4;

Estimated failure rate: 1x 0.043 x1.7=0.073(% / 1000 hours).

Mean time of failure: If the reliability function (Rt) abides by the exponential distribution, the failure rate will be constant in any section and the MTTF (Mean Time to Failures) will be the inverse number of the failure rate,

$$\text{MTTF} = \frac{1}{\text{Mean Failure Rate}}$$

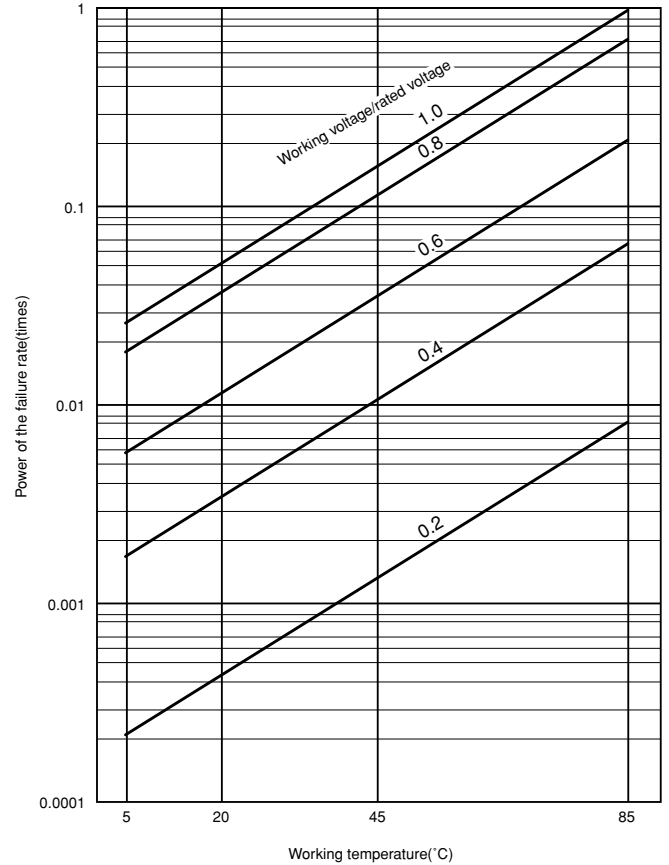


Fig.3 Relationship between the working temperature, applied voltage, and the failure rate.

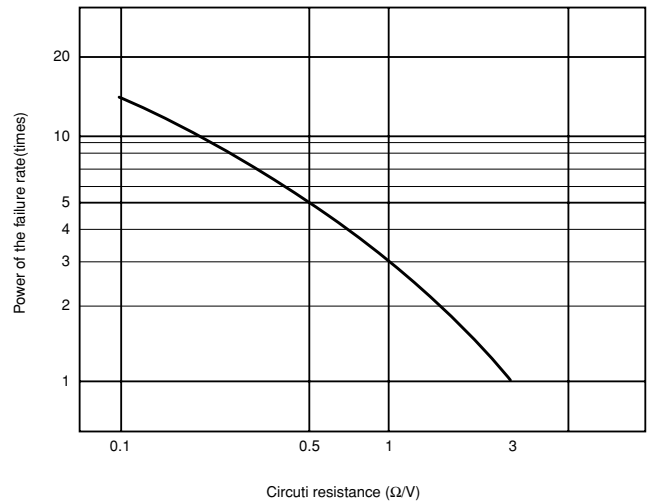


Fig.4 Relationship between the series circuit resistance and failure rate.

### ■ Ripple capability

The ripple current capability of tantalum solid electrolytic capacitor takes into consideration the equivalent series resistance (ESR) and the effect of heat generation due to ripple.

Ripple current generates heat due to the internal energy loss of the capacitor.

The allowable ripple current is decided by the heat generated due the internal resistance of the capacitor and the balance of thermal discharge of the mold resin, lead frame, and the like. The allowable ripple current is also presumed to be affected by capacitance, frequency, ambient temperature, case size, and the like.

Heat value, P, generated by ripple current due to the internal loss of the capacitor is expressed as follows.

$$P = I^2 R = \frac{V^2}{Z^2} R \dots\dots\dots ①$$

- Where
- P: Generated heat value (W)
  - I: Ripple current (Arms)
  - R: ESR ( $\Omega$ )
  - V: Ripple voltage (Vrms)
  - Z: Impedance ( $\Omega$ )

Temperature rise due to heat generation is expressed as follows;

$$\Delta T = \frac{P}{A \cdot H} \dots\dots\dots ②$$

- $\Delta T$ : Temperature rise due to heat generation (deg)
- A: Surface area ( $\text{cm}^2$ )
- H: Radiation coefficient ( $\text{W}/\text{cm}^2 \cdot \text{deg}$ )

Set an allowable ripple current and allowable voltage so that  $\Delta T$  should be 5deg or under.

In general, since the tantalum solid electrolytic capacitor does not often carry large low-frequency current for smoothing power supply or the like, allowable ripple voltage and current are set. This takes into consideration the effect of voltage in the low-frequency domain and that of current in the high-frequency domain.

### ■ Allowable ripple voltage and allowable ripple current in low-frequency domain

From Formula ①

$$V_{\text{max}} = Z \sqrt{\frac{P_{\text{max}}}{R}} \dots\dots ③$$

- $P_{\text{max}}$ : Maximum generated heat value
- $V_{\text{max}}$ : Maximum allowable ripple voltage

Where (1) The sum of the DC bias voltage and the max. AC applied ripple voltage (V max) can not exceed the rated voltage

(2) The sum of the DC bias voltage and the min. AC applied ripple voltage can not be a negative voltage (reverse voltage).

The maximum allowable ripple current is obtained by dividing the maximum allowable voltage by the Impedance.

$$I_{\text{rms}} = \frac{V_{\text{rms}}}{Z} \dots\dots\dots ④$$

$$Z = \sqrt{X^2 + R^2} \dots\dots\dots ⑤$$

$$X = \frac{1}{\omega C} + \omega L \dots\dots\dots ⑥$$

$$\omega = 2\pi f, R = \frac{\tan \delta}{\omega C} \dots\dots\dots ⑦$$

Now, since the inductance component can be neglected within the range of frequency we are facing.

$$Z = \sqrt{\left(\frac{1}{\omega C}\right)^2 + \left(\frac{\tan \delta}{\omega C}\right)^2}$$

$$= \left(\frac{1}{2\pi f C}\right) \sqrt{1 + (\tan \delta)^2} \dots\dots\dots ⑧$$

Since  $\tan \delta$  is as small as 0.02 to 0.04 within the low-frequency range of 500Hz or under, it is insignificant when compares to 1, therefore can be ignored.

From formula 8

$$Z = \frac{1}{2\pi f C} \dots\dots\dots ⑨$$

Substituting formula ⑨ for formula ④

$$I_{\text{rms}} = 2\pi f C V_{\text{rms}} \dots\dots\dots ⑩$$

Expressing the capacity in  $\mu\text{F}$ .

$$I_{\text{rms}} = 2\pi f C V_{\text{rms}} \times 10^{-6} \dots\dots\dots ⑪$$

### ■ Allowable ripple current in high-frequency domain

In a domain of 500Hz to several hundred kHz, since considerably large current flows through dielectric film due to low impedance, heat generated by ripple current must be taken into consideration.

From Formula ①

$$I_{\text{rms}} = \sqrt{\frac{P_{\text{max}}}{R}} \dots\dots\dots ⑫$$

The allowable maximum heat values generated at 20°C have been decided by case size as follows.

Table 1. Allowable maximum heat values by case size

Case Size	Allowable maximum heat values $P_{\text{max}}(\text{W})$	
	SPY	SYF,SKY,SYL
J	-	0.020
P	0.025	0.022
A2	-	0.026
A	-	0.030
B	0.085	0.030
C	-	0.050
D0	-	0.075

Where, R is ESR at a required frequency. Use  $(\bar{\chi} + 3\sigma)$  of actual average value for safety. Make a calculation using ESR values shown in the standard model table.

Furthermore, multiply the value by a temperature compensation coefficient taking heat radiation according to ambient temperature into consideration.

Table 2. Temperature compensation coefficient

Ambient temperature	Coefficient	
	SPY	SYF,SKY,SYL
20°C	1.0	1.0
50°C	-	0.7
85°C	0.9	0.5
105°C	0.4	-

**NOTE**  
Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

## ■ Soldering

1. It is recommended that chip type parts be soldered within the following conditions. Soldering should be carried out in a short time and at low temperature as much as possible.

### (1) Solder dipping method

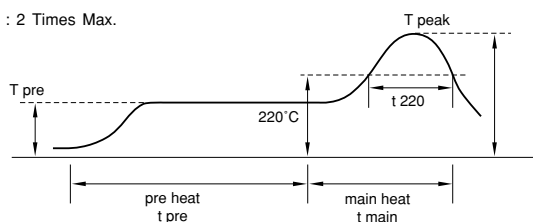
Solder temperature : Not more than 260°C

Dipping time : Not more than 5 s

### (2) Reflow method

According to the reflow profile conditions shown in the following.

Times : 2 Times Max.



		SPY	SYF,SKY,SYL
T pre	Preheating temperature	160~180°C	160~180°C
T peak	Peak temperature	240°C (Max.)	250°C (Max.)
t pre	Preheating time	100 s (Max.)	100 s (Max.)
t main	Main heating time	50 s (Max.)	50 s (Max.)
t 220	Time for which solder temperature exceeds 220°C	20 s (Max.)	40 s (Max.)
t peak	Time at peak temperature	5 s (Max.)	3 s (Max.)

The peak temperature of soldering recommends from 235 to 250°C.

Though upward heating, such as that by a hot plate, does not cause any problem, downward heating by an atmospheric furnace by means of infrared rays could raise the temperature of capacitors to temperatures higher than that of the substrate surface. Therefore, care must be taken.

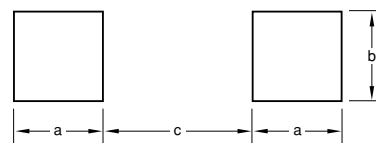
2. Use preliminary heating as far as possible, and relieve the temperature gradient for soldering.

3. Use resin flux.

4. For the reflow method, if the land area is too big in comparison with the capacitor terminal area, the capacitor is likely to slip or turn over. Therefore, caution must be taken.

5. For the solder bathing method, since high density packaging sometimes adversely affects solderability, take measures, such as removing air, into consideration.

## 6. Recommended pad pattern and size

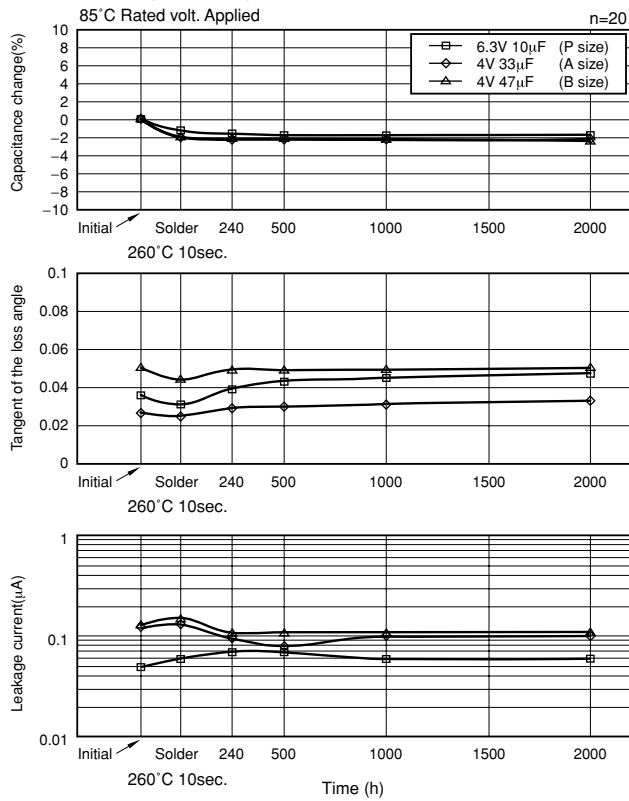


Unit : mm

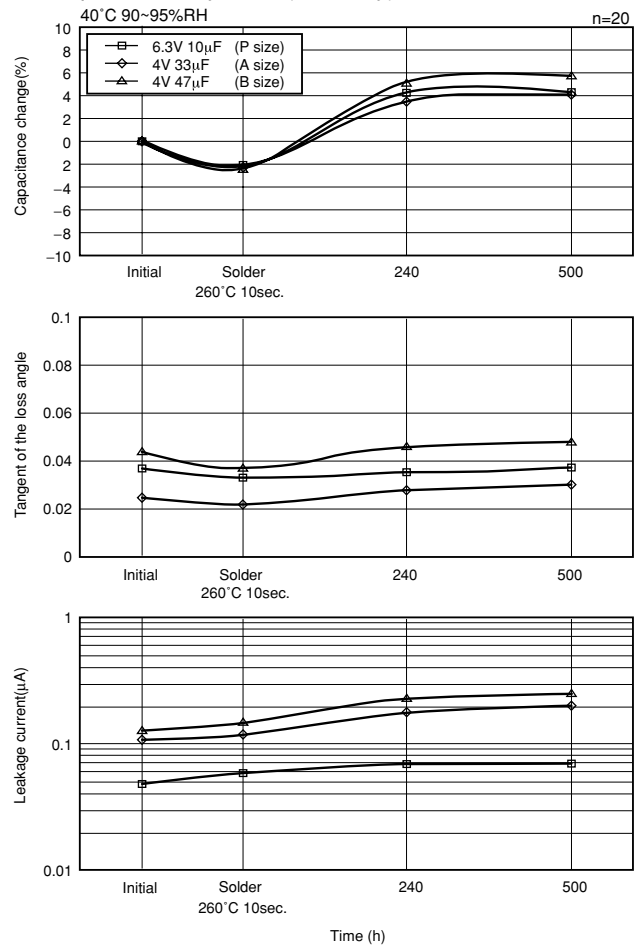
Case Size	a		b	c
	Solder Dipping	Reflow		
J	—	0.90	1.0	0.7
P	2.2	1.05	1.2	0.5
A2, A	2.9	1.35	1.5	1.1
B	3.0	1.35	2.7	1.4
C	4.1	2.0	2.7	2.9
D0	5.2	2.05	2.9	4.1

### Reference data

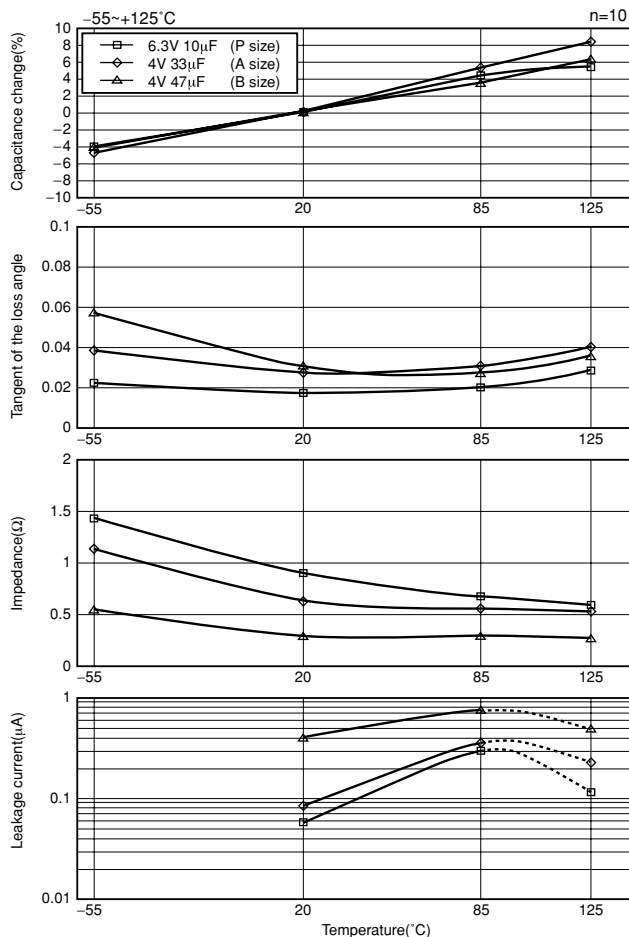
#### Endurance (Load life)



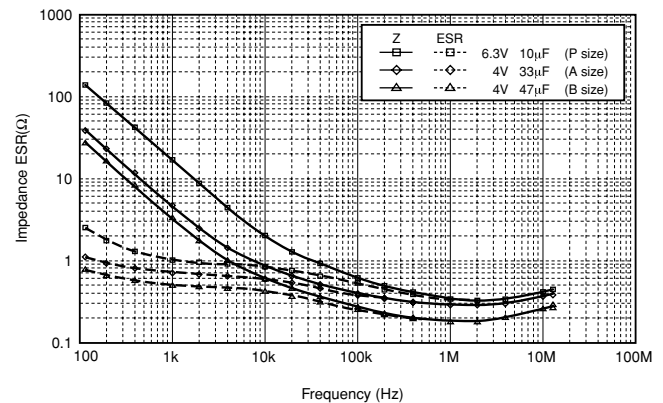
#### Damp hear, steady state (Humidity)



#### Temperature characteristics



#### Frequency characteristics



Notice: The measurement values are not guaranteed values, but measurements.

Data of leakage current at 125°C have been measured at category voltage.

# ELNA®

## Electric Double Layer Capacitors “DYNACAP”, “POWERCAP”

### List of Contents

1. Type List and Systematized Classification for Electric Double Layer Capacitors .....	144
2. Cautions for Using Electric Double Layer Capacitors .....	147
3. Lead Forming and Taping .....	149
4. Specifications for Electric Double Layer Capacitors by Series .....	150
5. Technical Note for Electric Double Layer Capacitors .....	164
6. Presentation of Series and Parallel Connection Pack .....	167
7. Technical data for Electric Double Layer Capacitors .....	168

# 3

## ■ Features

- Can be used as a rechargeable battery and ideal for backing up purposes.
- Capable of several hundreds of thousands of charge/discharge cycles; free from throwaway disposal.
- It does not contain toxic materials such as nickel and cadmium.

## ■ Type List for DYNACAP

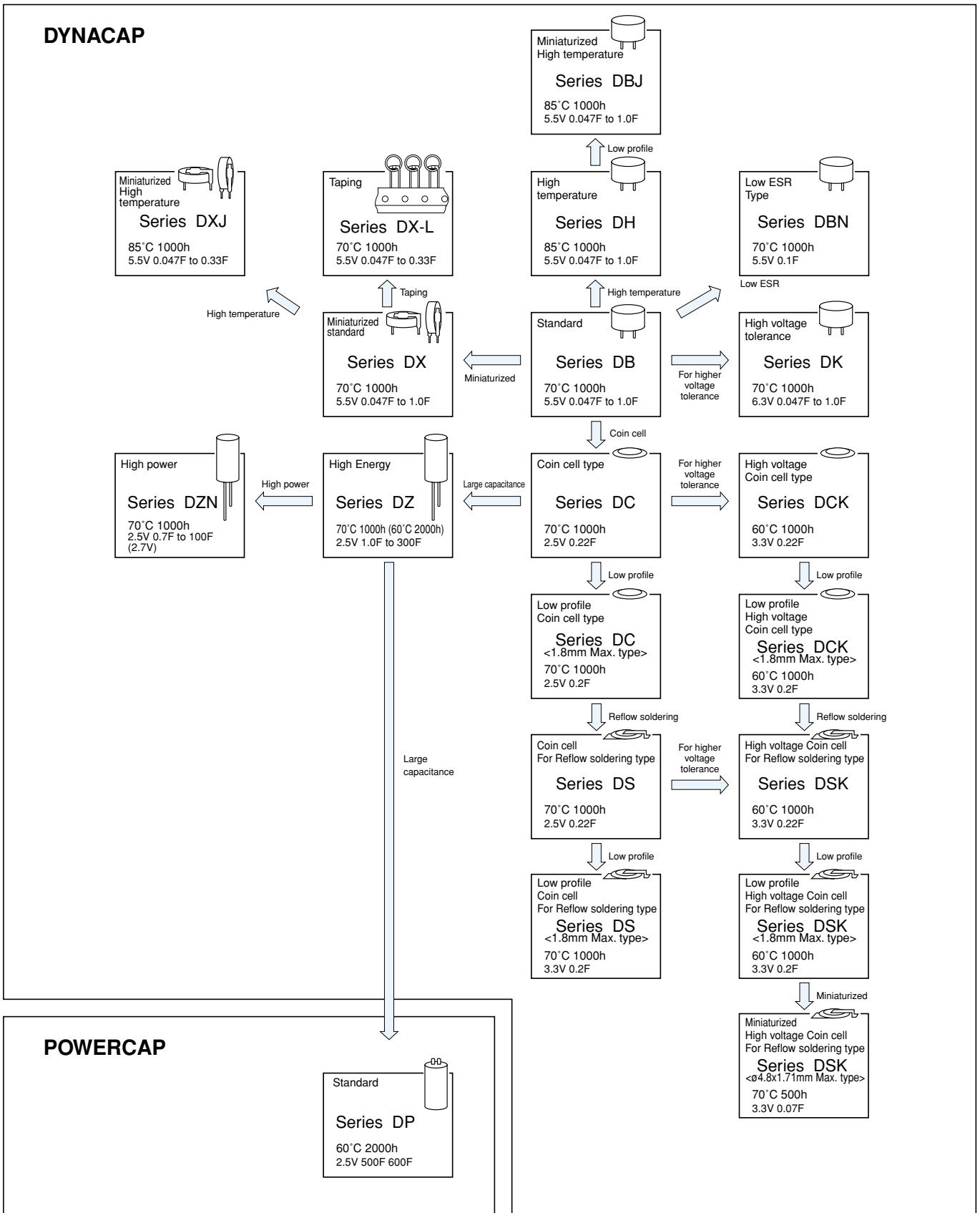
★ : New series

Category	Series	Category temp. range °C		Max. operating voltage V.DC	Capacitance range F	Color of sleeve	Page	Applications	Remarks
		Max.	Min.						
Standard type	DB	+70	-25	5.5	0.047 to 1.0	Indigo	150	Ideal for backing up of CMOS IC's, microcomputers, RAM's and the like used in VCR's, tuners, TV sets, telephone sets, DVD and others.	
Low ESR type	DBN	+70	-25	5.5	0.1	Indigo	150		
Low profile High temperature type	DBJ	+85	-10	5.5	0.047 to 1.0	Black	151		
Miniaturized Standard type	DX	+70	-25	5.5	0.047 to 1.0	Indigo	152	Ideal for backing up of CMOS IC's, microcom-puters, RAM's and the like used in VCR's, tuners, TV sets, telephone sets, DVD, pager units, cameras, personal wireless items and others.	
Miniaturized High temperature type	DXJ	+85	-10	5.5	0.047 to 0.33	Black	153	Ideal for backing up of CMOS IC's, microcom-puters, RAM's and the like used in VCR's, tuners, TV sets, telephone sets, DVD, pager units, cameras, personal wireless items and others.	
High voltage tolerance type	DK	+70	-25	6.3	0.047 to 1.0	Indigo	154	Ideal for backing up of Li -batterybacked equipment such as cameras, VCR's and telephone sets.	
High temperature type	DH	+85	-25	5.5	0.047 to 1.0	Indigo	155	Ideal for backing up of controls, electronic rice cooking jars, home bakeries and others.	
Coin type	DC (1.8mm Max.)	+70	-25	2.5	0.2	Silver	156	Ideal for backing up of pager, solar watches, solar calculators, solar remote control units, camaras and the like.	
	DCK (1.8mm Max.)	+60	-10	3.3	0.2				
	DC	+70	-25	2.5	0.22	Silver	157		
	DCK	+60	-10	3.3	0.22				
Reflow soldering Coin type	DSK (ø4.8x1.71mm)	+70	-10	3.3	0.07	Silver	158	Mountable on board with best suited for mainly memory and time functions as well as memory backup for PDA and DSC.	★
	DS (1.8mm Max.)	+70	-25	2.5	0.2	Silver	159		
	DSK (1.8mm Max.)	+60	-10	3.3	0.2				
	DS	+70	-25	2.5	0.22	Silver	160		
	DSK	+60	-10	3.3	0.22				
High Energy type	DZ	+70 / +60	-25	2.5	1.0 to 300	Black	161	Ideal for power supplies of LED displays, personal wireless items, backup for power supplies, and the storage battery of solar battery.	
High power type	DZN	+70	-25	2.5 / 2.7	0.7 to 100	Blue	162	Ideal for actuator of moters and electromagnetic coil drives.	

## ■ Type List for POWERCAP

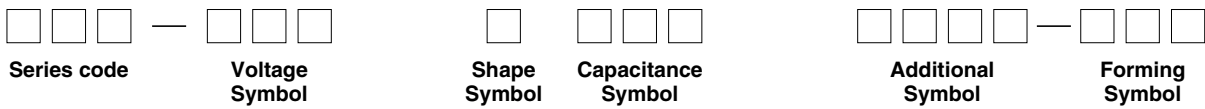
Category	Series	Category temp. range °C		Max. operating voltage V.DC	Capacitance range F	Color of sleeve	Page	Applications	Remarks
		Max.	Min.						
Standard type	DP	+60	-25	2.5	500, 600	Black	163	Ideal for power supplies of LED displays, backup for power supplies, the storage battery of solar battery, and actuator of moters and electromagnetic coil drives.	

Systematized Classification of Electric Double Layer Capacitors



Electric Double Layer Capacitors

■ Product Symbol System for Electric Double Layer Capacitors



Refer to the examples on the page describing a particular series.

Leave the boxes blank when no particular designation is made.

Enter the forming symbols given on page 149 for a taping a forming lead capacitor.

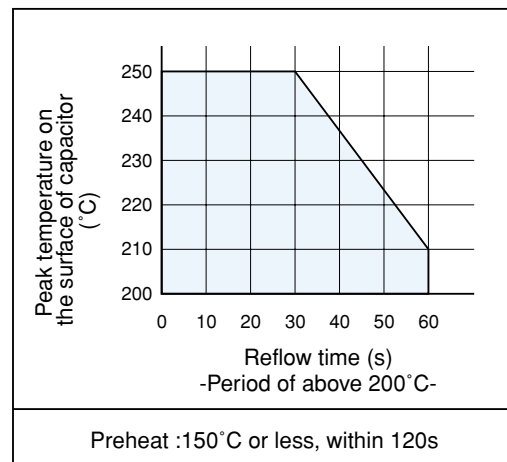
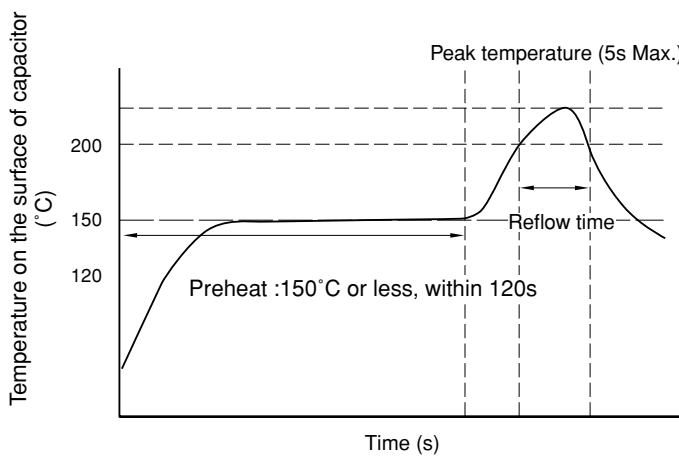
Max. voltage (V)	Voltage symbol
2.5	2R5
3.3	3R3
5.5	5R5
6.3	6R3

Capacitance (F)	Capacitance symbol
0.047	473
0.1	104
0.2	204
0.22	224
0.33	334
0.47	474
0.68	684
1	105
3.3	335
4.7	475
10	106
20	206
50	506
100	107
200	207

■ Recommended soldering method (series DS, DSK)

Method	Reflow soldering	Soldering iron	Flow soldering
Advisability	○	○	×

Reflow soldering conditions.



Attention : Carry out soldering work at low temperature and in the shortest time within above conditions. Do NOT reflow solder, when cell voltage is above 0.3V.



## Cautions for Using Electric Double Layer Capacitor (DYNACAP, POWERCAP)

### ■ Usage

#### 1. Electric double layer capacitors (EDLC) use a conductive organic electrolyte.

The use at excessive mounting temperature or exceeding the upper category temperature can cause the electrolyte to leak. Especially, coin and multilayer coin types (DB, DBN, DBJ, DX, DXJ, DX-L, DH, DK, DC, DCK, DS, and DSK series) excluding the DZ and DZN series use a low elastic plastic as the sealant in the cell construction like coin batteries; therefore, avoid using such capacitors in the vicinity of automotive equipment with steep temperature change, and heating element such as motor, relay, transformer, power IC, etc. because of the risk of leakage of electrolyte.

#### 2. Since EDLC is polarized, do not apply a reversed voltage.

EDLC is polarized. If a reversed voltage is applied for a long time, the leakage current will increase abruptly, which may cause a decrease in the capacity, an increase in the internal resistance, and causing leakage or damage to the product in some cases.

#### 3. Do not apply any voltage higher than the operating maximum voltage (this means the surge voltage in the case of short-time charge).

If an overvoltage is applied to the product, the leakage current will increase abruptly and the product will become overheated, which may cause a decrease in the capacity, an increase in the internal resistance, and causing leakage or damage to the product in some cases.

#### 4. Do not use smoothing a power supply (for absorbing its ripple).

Since the internal resistance of EDLC is high, the product will be overheated if it is used for smoothing a power supply (for absorbing its ripple), which may cause a decrease in the capacity, an increase in the internal resistance, and causing leakage or damage to the product in some cases.

#### 5. Do not use in a circuit where quick charge and discharge are repeated very often.

In a circuit where quick charge and discharge are repeated very often, the product will become overheated, which may cause a decrease in the capacity, an increase in the internal resistance, and causing leakage or damage to the product in some cases.

Reduce the charge and discharge currents while selecting a product with low internal resistance, and make sure that the product surface temperature does not rise.

#### 6. EDLC life depends heavily on the ambient temperature.

① The lifetime of EDLC is seriously affected by change in ambient temperature. If the temperature is lowered by 10°C, the lifetime will be approximately doubled. Therefore, the product should be used at a temperature lower than the guaranteed maximum value for maximum life.

② If the capacitor is used at a temperature exceeding its maximum guaranteed temperature, not only is its life shortened, but increased vapor

pressure of electrolyte or electrochemical reactions may increase the internal pressure, and causing leakage or damage to the product in some cases.

#### 7. Note that a voltage drop in EDLC occurs during backup.

In a case where discharge current is large, or a large current flows instantaneously, an electric double layer capacitor may not operate at the start of discharge because of a large voltage drop (IR drop) caused by the product with the DC internal resistance.

Please consult us for a large discharge current (in the case of other series except DZ, DZN and DP series: when larger than  $I [\text{mA}] = 1 \times C[\text{F}]$ ) as the internal resistance varies by each series. (Recommendation discharge current: 1 mA/F at 20°C)

#### 8. Do not use the product in an ambient atmosphere containing waterdrops (condensation) or toxic gases.

Although EDLC is sealed, water droplets or toxic gases may do degradation characteristics, a leakage and corrode the lead wires and the case, which may cause a breaking of the wires.

Avoid abrupt temperature changes, which may cause water droplets, resulting in product deterioration and electrolyte leakage.

#### 9. Contact us before connecting the products in series.

A series connection will cause an imbalance in the voltage, charged to the capacitors and an overvoltage may be charged to one or more them. This may cause a decrease in the capacity, an increase in the internal resistance and causing leakage or damage to the product in some cases. When using series connection for several capacitors, please derate the applied voltage from the operating maximum voltage or use balancing circuits (bleeder resistor, etc.) to compensate for the imbalance in the applied voltage for each capacitor. Moreover, please ensure the arrangement does not cause temperature fluctuation between capacitors.

#### 10. About vibration.

A terminal blank, a terminal bend, and a crease may occur by adding too much vibration to a capacitor.

Moreover, depending on the case, an EDLC may do degradation of the characteristic, breakage, and a leakage.

When you become too much vibration, please contact our company.

#### 11. When used on a double sided printed circuit board, do not overlap the wiring patterns on the mounted part.

A short circuit may be created by certain wiring conditions. Should the electrolyte leaks, the circuit pattern may cause a short circuit, resulting in tracking or migration.

#### 12. Do not keep in high temperature and high humidity atmospheres.

① Avoid high temperature or high humidity or direct rays when storing capacitors.

② Keep the product in a place where the temperature is 5°C~30°C and the humidity is lower

than 60%. Avoid an abrupt temperature change, which may cause condensation or deterioration of the product or liquid leakage.

③ Do not store EDLC at a place where there is a possibility that they may get water, salt or oil spill.

④ Do not store EDLC at place where the air contains dense hazardous gas (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine ammonia, etc.).

⑤ Do not store EDLC at a place where it gets ultraviolet ray or radioactive ray.

### 13. Capacitors fitted with a relief valve

① The relief valve is provided with a valve function with part of the case made thin to avoid explosion by increased internal pressure when the capacitor is under abnormal load such as overvoltage or reverse voltage. After activation of the relief valve, the capacitor must be replaced as it does not restore.

② For the capacitors with a case relief valve, provide a void on the top of the relief valve so as not to hamper its activation. Make a void of 2 mm or more for the product of  $\phi 18$  or less in diameter, and a void of 3 mm or more for the product of  $\phi 20$  to  $\phi 35$  mm in diameter on the top.

## ■ Mounting

### 1. Do not overheat when soldered.

Depending on the type and size of the board, the product may be subjected to overheat, leading to loss of airtightness. This may greatly shorten the product life or cause liquid leakage.

In case of a 1.6mm-thick and single side printed board. for example, keep the following soldering conditions: temperature lower than  $260^{\circ}\text{C}$ , time shorter than 5 seconds.

When a board thinner than 1.6 mm or multi-layer printed board is used, contact us.

In the case of hand soldering, the iron tip temperature is lower than  $360^{\circ}\text{C}$ , time is shorter than 3 seconds.

The coin types and multilayer coin types excluding the DZ and reflow-compatible coin types use polypropylene as the pacing material for sealing and therefore susceptible to excessive heat. Note that the component body temperature shall be controlled so as not to exceed  $90^{\circ}\text{C}$  including preheating.

Recommended preheating conditions are as shown below : Conditions : At the time of flow, the peak temperature on the rear of the thermal shield shall be  $110^{\circ}\text{C}$  or less, with the total heating time within 60 seconds. After that, dip the terminal tip of the component into the bath soldering temperature of  $260 \pm 3^{\circ}\text{C}$  for  $5 +1/-0$  seconds. The second flow, if conducted, shall be done after the product temperature has been cooled down to room temperature.

### 2. When soldering the capacitor to the wiring board, do not attach the body of the capacitor to the circuit board.

If the body of the capacitor is attached directly to the circuit board, the flux or solder can blow through the through holes in the circuit board, negatively impacting the capacitor.

### 3. Contact us when cleaning is necessary after soldering.

Certain types of solvents are not compatible and may cause damage.

### 4. Contact us when the product is attached by adhesive bonding.

Certain types of adhesives are not compatible.

Paste bond partially between the product and the board so that the product will not adhere completely to the board.

Do not raise the temperature over the guaranteed value while the bond is hardening.

### 5. Heating conditions of adhesive curing oven

During heating of the adhesive curing oven, application of excessive heat may significantly shorten the product life or cause liquid leakage. Control the body temperature so as not to exceed  $90^{\circ}\text{C}$  during work while setting the allowable atmospheric temperature below  $110^{\circ}\text{C}$ , and allowable heating time within 30 seconds.

For the heating conditions deviating from the above, consult with us providing your temperature profile conditions.

### 6. Be careful not to apply an excessive force to the capacitor body, terminals or lead wires.

① Mount the capacitor while making sure that the terminal spacing of the capacitor and the spacing of the holes in the printed wiring board are aligned.

② If the capacitor body is subjected to stress such as grabbing, falling, bend, pushing or twisting after mounted, its terminals may come off, leading to open, short or liquid leakage.

## ■ Other cautions

### 1. Emergency procedures

If the EDLC overheats or starts to smell, immediately switch off the units main power supply to stop operation.

Keep your face and hands away from the EDLC, since the temperature may be high enough to cause the EDLC to ignite and burn.

### 2. Periodical inspections should be established for the EDLC used in industrial appliances.

The following items should be checked:

① Appearance : Check if there is leakage.

② Electronic performance : Check the leakage current, the electrostatic, the internal resistance and other items described in the catalog or the product specifications.

### 3. Disposing of EDLC.

① Punch a hole or crush the EDLC (to prevent explosion) before incineration at approved facility.

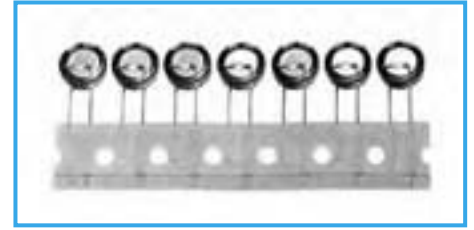
② If they are not to be incinerated, bring them to a professional industrial waste disposal company.

### 4. Other notes.

Please refer to the following literature for anything not described in the product specifications or the catalog. (Technical Report of Japan Electronics and Information Technology Industries Association #EIAJ RCR-2370A "Guideline of notabilia for fixed electric double layer capacitors")

**Taping** (applicable to Series DX and DXJ)

- For automatic insertion.
- The  $\phi 11.5 \times 12.4L$  size can encase up to 0.33F.



Part numbering system (example: 5.5V0.1F)							
DX	—	5R5	L	104	T	—	T20
Series code		Voltage		Rated capacitance code			Taping machining designation

Taping Dimensions

Unit: mm

Lead forming symbol	Taping dimension					Outline drawing	Packing method
	F	H	H <sub>1</sub>	P	$\phi d$		
T20	5.0	18.0	32.2Max.	12.7	0.6		Flat box 

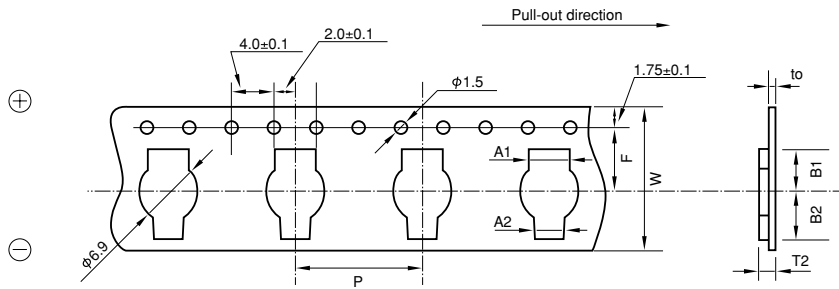
Minimum Packing Quantity

Minimum Packing quantity
750 PCS.

Note

Do not apply external force to products or terminals as stress such as twisting, bending, pushing, or falling of such products or terminals may remove the terminals, resulting in an open/short circuit or liquid leakage. Avoid applying excessive heat to capacitors during heating of an adhesive curing oven. For details, refer to the precautions in use of DYNACAP.

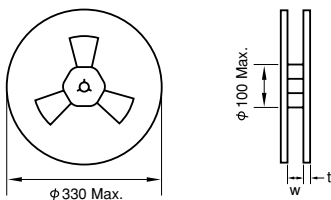
**Carrier tape dimensions (Series DS, DSK) polarity L**



Outside size	W	P	F	A1	A2	B1	B2	T2	to
$\phi 6.8 \times 1.4 \sim 2.1L$	$24 \pm 0.2$	12.0	11.5	4.4	3.4	5.9	6.5	3.2	0.3
$\phi 4.8 \times 1.4L$	$16 \pm 0.2$	8.0	7.5	2.4	3.6	5.0	5.1	2.45	0.3

(mm)

**Reel dimensions**



(Unit:mm)

Outside size	Real dimension	
	W	t
$\phi 6.8 \times 1.4 \sim 2.1L$	26	3
$\phi 4.8 \times 1.4L$	18	3

**Packing quantity**

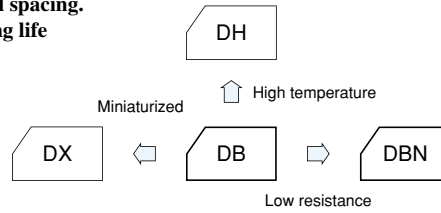
Outside size	Quantity
$\phi 6.8 \times 2.1L$	1500PCS.
$\phi 6.8 \times 1.4L$	1500PCS.
$\phi 4.8 \times 1.4L$	2000PCS.

**NOTE**  
Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

## 5.5V Standard Capacitors Series DB

GREEN CAP 70°C

- Small-sized, large capacity, excellent voltage holding.
- For all ratings, uniform 5mm pitch of terminal spacing.
- Wider temperature range(-25~+70°C) and long life than battery.
- $\phi 13.5 \times 7.5$  l size can encase up to 0.33F.
- Ideal for backing up of CMOS's, microcomputers, RAM's and the like used in VCR's, tuners, TV sets, telephone sets and others.

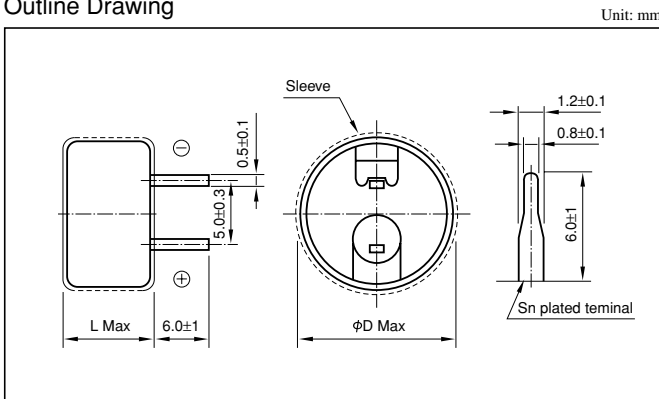


Marking color : White print on an indigo sleeve

### Specifications

Item	Performance							
Category temperature range (°C)	-25 to +70							
Tolerance at rated capacitance (%)	-20 to +80							
Internal resistance at 1 kHz	Rated Capacitance (F)	0.047	0.1	0.22	0.33	0.47	1.0	
	Internal resistance (Ω)	120	75	75	75	30	30	
Characteristics at high and low temperature	Percentage of capacitance change	Within ±30% of the value at 20°C						
	Internal resistance	Less than five times of the value at 20°C						
Endurance (70°C)	Test time	1000 hours						
	Percentage of capacitance change	Within ±30% of the initial measured value						
	Internal resistance	Within four times of the initial specified value						
Shelf life (70°C)	Test time :1000 hours : Same as endurance.							

### Outline Drawing



### Standard Ratings

Max. operating voltage(V)	Rated capacitance(F)	ELNA Parts No.	φ DxL(mm)
5.5	0.047	DB-5R5D473T	13.5x7.5
5.5	0.1	DB-5R5D104T	13.5x7.5
5.5	0.22	DB-5R5D224T	13.5x7.5
5.5	0.33	DB-5R5D334T	13.5x7.5
5.5	0.47	DB-5R5D474T	21.5x8.0
5.5	1.0	DB-5R5D105T	21.5x8.0

### Part numbering system (example: 5.5V0.1F)

DB	—	5R5	D	104	T
Series code		Rated voltage symbol		Rated capacitance symbol	

Part number is refer to above table.

## 5.5V Low Resistance Series DBN

GREEN CAP 70°C Low ESR

- Internal resistance was reduced to 1/3 to DB series.
- It excels in rapid charge.

### Specifications

Item	Performance	
Category temperature range (°C)	-25 to +70	
Tolerance at rated capacitance (%)	-20 to +80	
Internal resistance at 1 kHz	Rated Capacitance (F)	0.1
	Internal resistance (Ω)	25
Characteristics at high and low temperature	Percentage of capacitance change	Within ±30% of the value at 20°C
	Internal resistance	Less than five times of the value at 20°C
Endurance (70°C)	Test time	1000 hours
	Percentage of capacitance change	Within ±30% of the initial measured value
	Internal resistance	Within four times of the initial specified value
Shelf life (70°C)	Test time :1000 hours : Same as endurance.	

### Standard Ratings

Max. operating voltage(V)	Rated capacitance(F)	ELNA Parts No.	φ DxL(mm)
5.5	0.1	DBN-5R5D104T	13.5x7.5

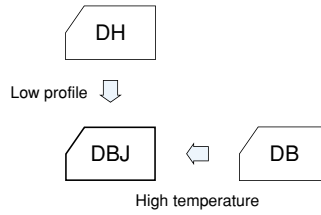
### Part numbering system

DBN	—	5R5	D	104	T
Series code		Rated voltage symbol		Rated capacitance symbol	

5.5V Low profile and high temperature Capacitors

GREEN CAP 85°C

- High temperature type of series DB.
- Small-sized, large capacity, excellent voltage holding.
- For all ratings, uniform 5mm pitch of terminal spacing.
- ø13.5x7.5 l size can encase up to 0.33F.
- Ideal for backing up of CMOS's, microcomputers, RAM's and the like used in VCR's, tuners, TV sets, telephone sets and others.



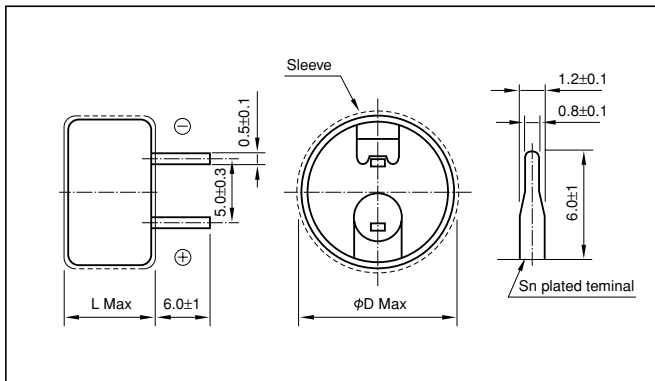
Marking color : White print on a black sleeve

Specifications

Item	Performance							
Category temperature range (°C)	-10 to +85							
Tolerance at rated capacitance (%)	-20 to +80							
Internal resistance at 1 kHz	Rated Capacitance (F)	0.047	0.1	0.22	0.33	0.47	1.0	
	Internal resistance (Ω)	200	150	150	150	75	75	
Characteristics at high and low temperature	Percentage of capacitance change	Within ±30% of the value at 20°C						
	Internal resistance	Within four times of the initial specified value						
Endurance (85°C)	Test time	1000 hours						
	Percentage of capacitance change	Within ±30% of the initial measured value						
	Internal resistance	Within five times of the initial specified value						
Shelf life (85°C)	Test time :1000 hours : Same as endurance.							

Outline Drawing

Unit: mm



Part numbering system (example: 5.5V0.1F)				
DBJ	—	5R5	D	104 T
Series code		Rated voltage symbol		Rated capacitance symbol

Part number is refer to below table.

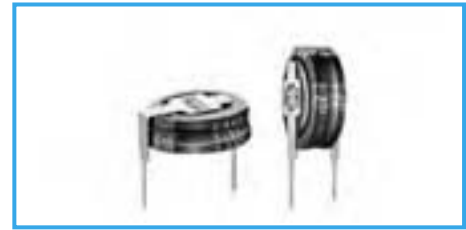
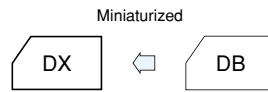
Standard Ratings

Max. operating voltage(V)	Rated capacitance(F)	ELNA Parts No.	φ DxL(mm)
5.5	0.047	DBJ-5R5D473T	13.5x7.5
5.5	0.1	DBJ-5R5D104T	13.5x7.5
5.5	0.22	DBJ-5R5D224T	13.5x7.5
5.5	0.33	DBJ-5R5D334T	13.5x7.5
5.5	0.47	DBJ-5R5D474T	21.5x8.0
5.5	1.0	DBJ-5R5D105T	21.5x8.0

## 5.5V Miniaturized Standard Capacitors

GREEN CAP 70°C

- Smaller and lighter than Series DB.
- 5mm tall. Max. thin profile(H-shaped).
- Miniaturized but can encase up to 0.33F in 11.5x5mm case.



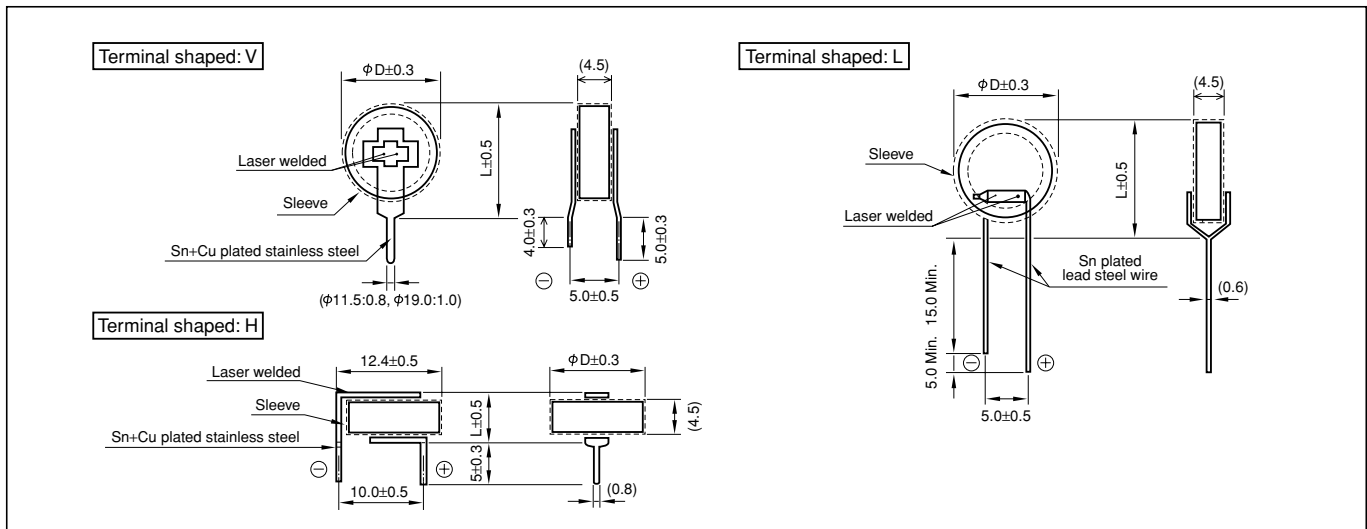
Marking color : White print on an indigo sleeve

### Specifications

Item	Performance					
Category temperature range (°C)	-25 to +70					
Tolerance at rated capacitance (%)	-20 to +80					
Internal resistance at 1 kHz	Rated Capacitance (F)	0.047	0.1	0.22	0.33	1.0
	Internal resistance (Ω)	120	75	75	75	30
Characteristics at high and low temperature	Percentage of capacitance change	Within ±30% of the value at 20°C				
	Internal resistance	Less than five times of the value at 20°C				
Endurance (70°C)	Test time	1000 hours				
	Percentage of capacitance change	Within ±30% of the initial measured value				
	Internal resistance	Within four times of the initial specified value				
Shelf life (70°C)	Test time : 1000 hours ; Same as endurance.					

### Outline Drawing

Unit: mm



Part numbering system (example: 5.5V0.1F)

DX	—	5R5	□	104	□
Series code		Rated voltage symbol	Terminal shaped	Capacitance tolerance symbol	Additional symbol

Part number is refer to below table.

### Note

Do not apply external force to products or terminals as stress such as twisting, bending, pushing, or falling of such products or terminals may remove the terminals, resulting in an open/short circuit or liquid leakage. Avoid applying excessive heat to capacitors during heating of an adhesive curing oven. For details, refer to the precautions in use of DYNACAP.

### Standard Ratings

Max. operating voltage(V)	Rated capacitance(F)	ELNA Parts No.	φ DxL(mm)
5.5	0.047	DX-5R5V473U	11.5x13.0
		DX-5R5H473U	11.5x 5.0
		DX-5R5L473T	11.5x12.4
5.5	0.1	DX-5R5V104U	11.5x13.0
		DX-5R5H104U	11.5x 5.0
		DX-5R5L104T	11.5x12.4
5.5	0.22	DX-5R5V224U	11.5x13.0
		DX-5R5H224U	11.5x 5.0
		DX-5R5L224T	11.5x12.4
5.5	0.33	DX-5R5V334U	11.5x13.0
		DX-5R5H334U	11.5x 5.0
		DX-5R5L334T	11.5x12.4
5.5	1.0	DX-5R5V105U	19.0x20.5



5.5V Miniaturized High temperature Capacitors

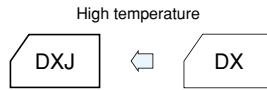
GREEN CAP

85°C

- High temperature type of Series DX.
- 5mm tall. Max. thin profile(H-shaped).
- Miniaturized but can encase up to 0.33F in 11.5x5mm case.



Marking color : White print on a black sleeve

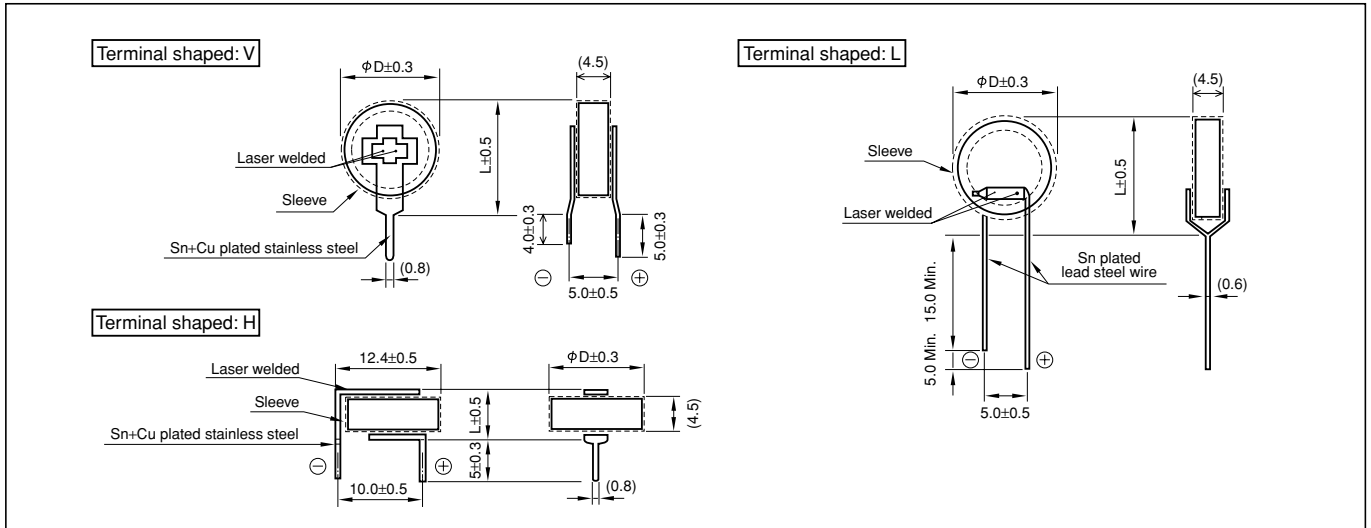


Specifications

Item	Performance				
Category temperature range (°C)	-10 to +85				
Tolerance at rated capacitance (%)	-20 to +80				
Internal resistance at 1 kHz	Rated Capacitance (F)	0.047	0.1	0.22	0.33
	Internal resistance (Ω)	200	150	150	150
Characteristics at high and low temperature	Percentage of capacitance change	Within ±30% of the value at 20°C			
	Internal resistance	Within four times of the initial specified value			
Endurance (85°C)	Test time	1000 hours			
	Percentage of capacitance change	Within ±30% of the initial measured value			
	Internal resistance	Within four times of the initial specified value			
Shelf life (85°C)	Test time :1000 hours ; Same as endurance.				

Outline Drawing

Unit: mm



Part numbering system (example: 5.5V0.1F)

DXJ	—	5R5	□	104	□
Series code		Rated voltage symbol	Terminal shaped	Capacitance tolerance symbol	Additional symbol

Part number is refer to below table.

Note

Do not apply external force to products or terminals as stress such as twisting, bending, pushing, or falling of such products or terminals may remove the terminals, resulting in an open/short circuit or liquid leakage. Avoid applying excessive heat to capacitors during heating of an adhesive curing oven. For details, refer to the precautions in use of DYNACAP.

Standard Ratings

Max. operating voltage(V)	Rated capacitance(F)	ELNA Parts No.	φ DxL(mm)
5.5	0.047	DXJ-5R5V473U	11.5x13.0
		DXJ-5R5H473U	11.5x 5.0
		DXJ-5R5L473T	11.5x12.4
5.5	0.1	DXJ-5R5V104U	11.5x13.0
		DXJ-5R5H104U	11.5x 5.0
		DXJ-5R5L104T	11.5x12.4
5.5	0.22	DXJ-5R5V224U	11.5x13.0
		DXJ-5R5H224U	11.5x 5.0
		DXJ-5R5L224T	11.5x12.4
5.5	0.33	DXJ-5R5V334U	11.5x13.0
		DXJ-5R5H334U	11.5x 5.0
		DXJ-5R5L334T	11.5x12.4

## High Voltage Tolerance Capacitors

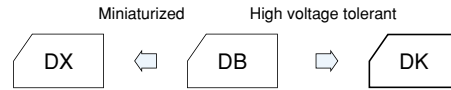
GREEN CAP

70°C

- High voltage tolerant(6.3V guaranteed) and highly reliable.
- Ideal for backing up of Li-battery-backed equipment such as cameras, VCR's and telephone sets.



Marking color : White print on an indigo sleeve

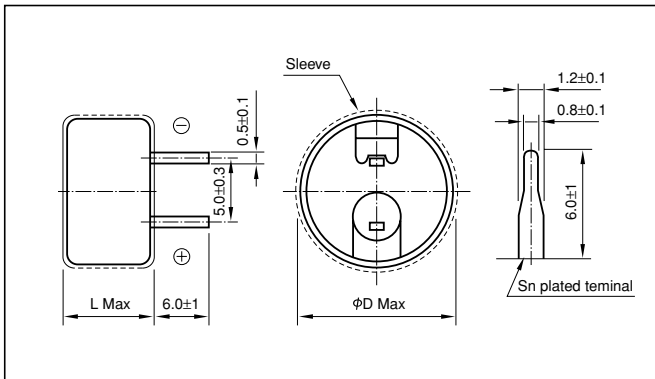


### Specifications

Item	Performance					
Category temperature range (°C)	-25 to +70					
Tolerance at rated capacitance (%)	-20 to +80					
Internal resistance at 1 kHz	Rated Capacitance (F)	0.047	0.1	0.47	0.68	1.0
	Internal resistance (Ω)	300	200	50	50	30
Characteristics at high and low temperature	Percentage of capacitance change	Within ±30% of the value at 20°C				
	Internal resistance	less than five times of the value at 20°C				
Endurance (70°C)	Test time	1000 hours				
	Percentage of capacitance change	Within ±30% of the initial measured value				
	Internal resistance	Within four times of the initial specified value				
Shelf life (70°C)	Test time :1000 hours : Same as endurance.					

### Outline Drawing

Unit: mm



### Part numbering system (example: 6.3V0.1F)

DK	—	6R3	D	104	T
Series code		Rated voltage symbol		Rated capacitance symbol	

Part number is refer to below table.

### Standard Ratings

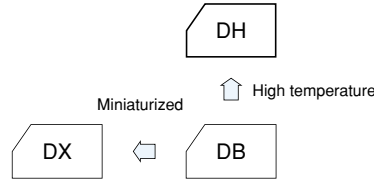
Max. operating voltage(V)	Rated capacitance(F)	ELNA Parts No.	φ DxL(mm)
6.3	0.047	DK-6R3D473T	13.5x9.5
6.3	0.1	DK-6R3D104T	13.5x9.5
6.3	0.47	DK-6R3D474T	21.5x9.5
6.3	0.68	DK-6R3D684T	21.5x9.5
6.3	1.0	DK-6R3D105T	21.5x9.5



High-Temperature Capacitors

GREEN CAP 85°C

- High temperature tolerant(-25~+85°C) and highly reliable.
- Ideal for backing up of controls, electronic rice cooking jars, home bakeries and the like.



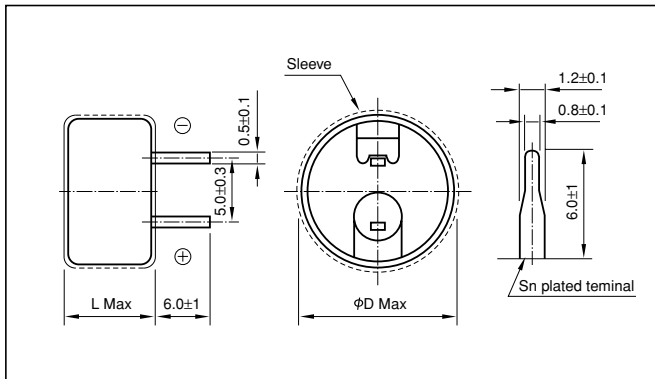
Marking color : White print on an indigo sleeve

Specifications

Item	Performance							
Category temperature range (°C)	-25 to +85							
Tolerance at rated capacitance (%)	-20 to +80							
Internal resistance at 1 kHz	Rated Capacitance (F)	0.047	0.1	0.22	0.47	0.68	1.0	
	Internal resistance (Ω)	300	200	120	50	50	30	
Characteristics at high and low temperature	Percentage of capacitance change	Within ±30% of the value at 20°C						
	Internal resistance	less than five times of the value at 20°C						
Endurance (85°C)	Test time	1000 hours						
	Percentage of capacitance change	Within ±30% of the initial measured value						
	Internal resistance	Within four times of the initial specified value						
Shelf life (85°C)	Test time :1000 hours ; Same as endurance.							

Outline Drawing

Unit: mm



Part numbering system (example: 5.5V0.1F)

DH	—	5R5	D	104	T
Series code		Rated voltage symbol		Rated capacitance symbol	

Part number is refer to below table.

Standard Ratings

Max. operating voltage(V)	Rated capacitance(F)	ELNA Parts No.	φ DxL(mm)
5.5	0.047	DH-5R5D473T	13.5x9.5
5.5	0.1	DH-5R5D104T	13.5x9.5
5.5	0.22	DH-5R5D224T	13.5x9.5
5.5	0.47	DH-5R5D474T	21.5x9.5
5.5	0.68	DH-5R5D684T	21.5x9.5
5.5	1.0	DH-5R5D105T	21.5x9.5

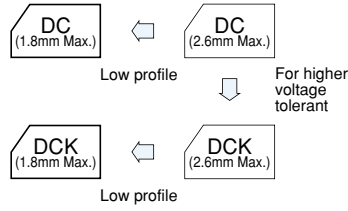
# DC, DCK-614 ELECTRIC DOUBLE LAYER CAPACITORS "DYNACAP"



## 1.8mm Max. height Coin Cell Capacitors

GREEN CAP 60°C / 70°C

- Unlike batteries, the number of charging/ discharging cycles unlimited and rapid charging/ discharging is possible.
- High reliability, Safe and unlike secondary batteries, this is pollution free devices.
- 1.8mm height type made lineup in the DC, DCK series.

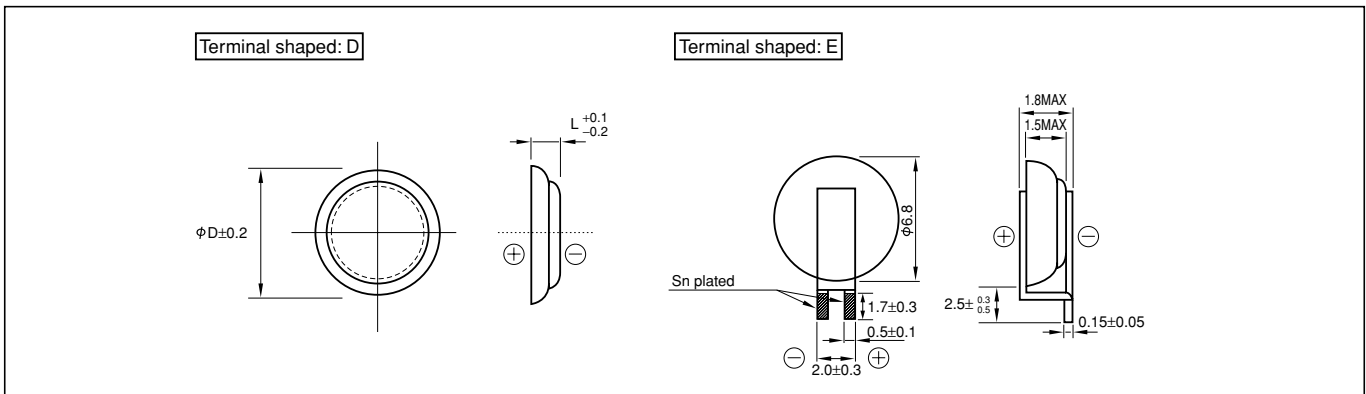


### Specifications

Item	Performance			
	DC series		DCK series	
Series Name	DC series		DCK series	
Rated voltage (V)	2.5		3.3	
Category temperature range (°C)	-25 to +70		-10 to +60	
Tolerance at rated capacitance (%)	-20 to +80		-20 to +80	
Rated Capacitance (F)	0.2		0.2	
Internal resistance(Ω) at 1 kHz	100		200	
Characteristics at high and low temperature	Percentage of capacitance change	Within ±30% of the value at 20°C	Percentage of capacitance change	Within ±50% of the value at 20°C
	Internal resistance	Less than five times of the value at 20°C	Internal resistance	Within ten times the initial specified value
Endurance	Test temperature	70°C	Test temperature	60°C
	Test time	1000 hours	Test time	1000 hours
	Percentage of capacitance change	Within ±30% of the initial measured value	Percentage of capacitance change	Within ±30% of the initial measured value
	Internal resistance	2kΩ Max.	Internal resistance	4kΩ Max.
Shelf life	Test time :1000 hours ; Same as endurance.			

### Outline Drawing

Unit: mm



#### Part numbering system (example: 2.5V0.2F, terminal shaped: E)

DC	—	2R5	E	204	T 614	—	E
Series code		Rated voltage symbol		Rated capacitance symbol	Additional symbol		

#### Part numbering system (example: 3.3V0.2F, terminal shaped: E)

DCK	—	3R3	E	204	T 614	—	E
Series code		Rated voltage symbol		Rated capacitance symbol	Additional symbol		

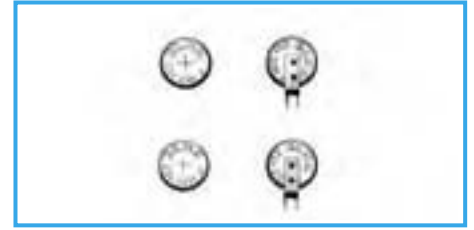
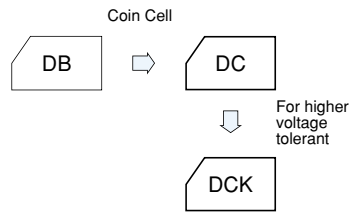
### Standard Ratings

Max. operating voltage(V)	Rated capacitance(F)	ELNA Parts No.	φ DxL(mm)
2.5	0.2	DC-2R5D204T614	6.8x1.4
		DC-2R5E204T614-E	
3.3	0.2	DCK-3R3D204T614	6.8x1.4
		DCK-3R3E204T614-E	

## Coin Cell Capacitors

GREEN CAP 60°C / 70°C

- Small-sized, but large capacity.
- Unlike batteries, unlimited charge/discharge cycles; ideal for solar watches, solar calculators, solar remote control units, camaras and the like.

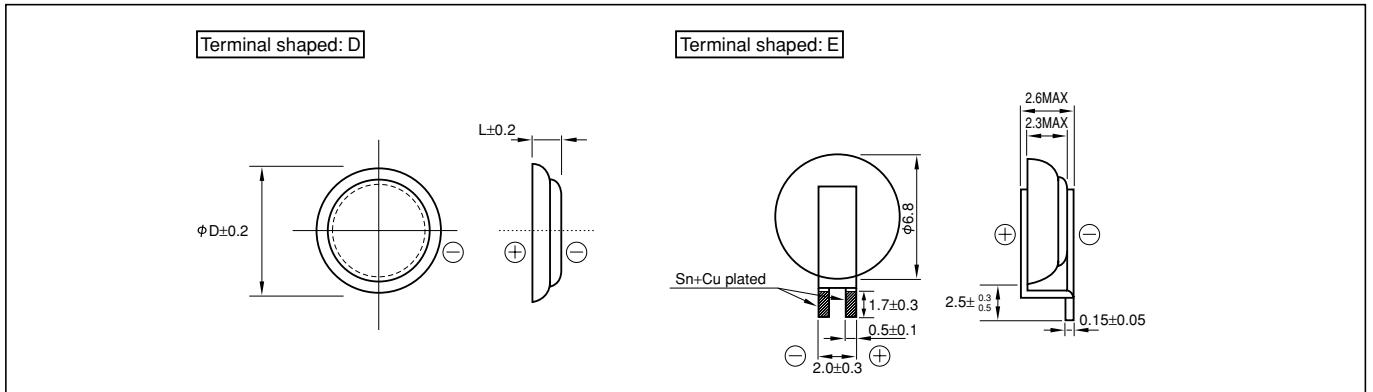


### Specifications

Item	Performance			
	DC series		DCK series	
Series Name	DC series		DCK series	
Rated voltage (V)	2.5		3.3	
Category temperature range (°C)	-25 to +70		-10 to +60	
Tolerance at rated capacitance (%)	-20 to +80		-20 to +80	
Rated Capacitance (F)	0.22		0.22	
Internal resistance(Ω) at 1 kHz	100		200	
Characteristics at high and low temperature	Percentage of capacitance change	Within ±30% of the value at 20°C	Percentage of capacitance change	Within ±50% of the value at 20°C
	Internal resistance	Less than five times of the value at 20°C	Internal resistance	Within five times the initial specified value
Endurance	Test temperature	70°C	Test temperature	60°C
	Test time	1000 hours	Test time	1000 hours
	Percentage of capacitance change	Within ±30% of the initial measured value	Percentage of capacitance change	Within ±30% of the initial measured value
	Internal resistance	Within four times of the initial specified value	Internal resistance	Within four times of the initial specified value
Shelf life	Test time :1000 hours ; Same as endurance.			

### Outline Drawing

Unit: mm



Part numbering system (example: 2.5V0.22F, terminal shaped: E)

DC	—	2R5	E	224	□	—	E
Series code		Rated voltage symbol		Rated capacitance symbol	Additional symbol		

Part numbering system (example: 3.3V0.22F, terminal shaped: E)

DCK	—	3R3	E	224	□	—	E
Series code		Rated voltage symbol		Rated capacitance symbol	Additional symbol		

Part number is refer to below table.

### Standard Ratings

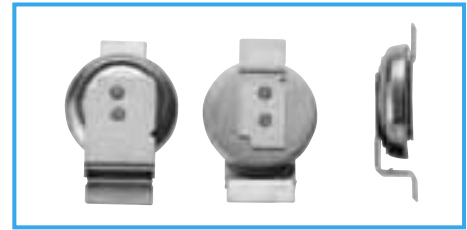
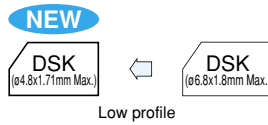
Max. operating voltage(V)	Rated capacitance(F)	ELNA Parts No.	φ DxL(mm)
2.5	0.22	DC-2R5D224	6.8x2.1
		DC-2R5E224U-E	
3.3	0.22	DCK-3R3D224	6.8x2.1
		DCK-3R3E224U-E	

## ø4.8 x 1.71mm Max. height Coin Cell Capacitors

GREEN CAP

70°C

- Reflow soldering method available.
- Unlike batteries, the number of charging/ discharging cycles unlimited and rapid charging/ discharging is possible.
- High reliability, Safe and unlike secondary batteries, this is pollution free devices.
- ø4.8 x 1.71mm Max height type made lineup in the DSK series.

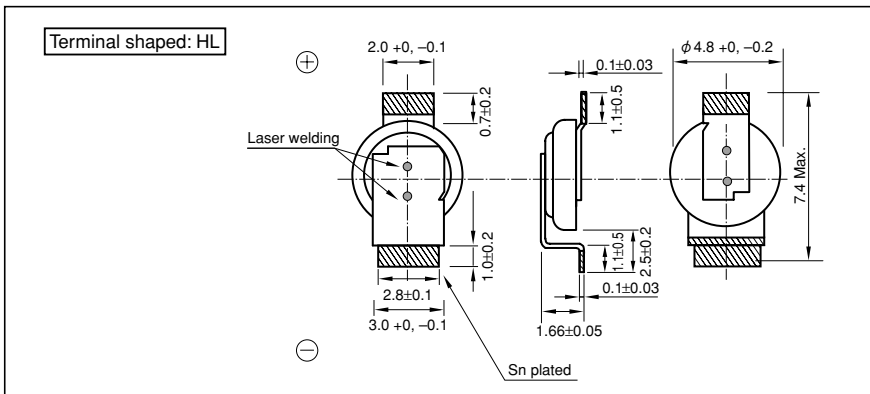


### Specifications

Item	Performance	
Series Name	DSK series	
Rated voltage (V)	3.3	
Category temperature range (°C)	-10 to +70	
Tolerance at rated capacitance (%)	-20 to +80	
Rated Capacitance (F)	0.07	
Internal resistance(Ω) at 1 kHz	100	
Characteristics at high and low temperature	Percentage of capacitance change	Within ±50% of the value at 20°C
	Internal resistance	Within ten times the initial specified value
Endurance	Test temperature	70°C
	Test time	500 hours
	Percentage of capacitance change	Within ±30% of the initial measured value
	Internal resistance	1.5kΩ or less
Shelf life	Test time :500 hours ; Same as endurance.	

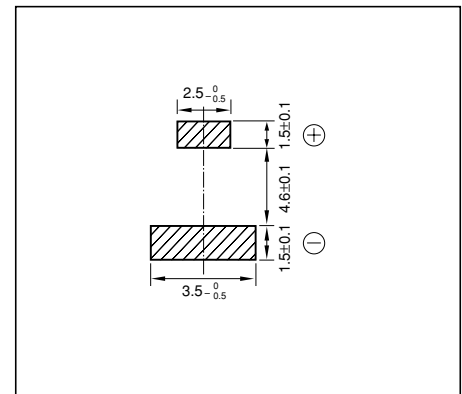
### Outline Drawing

Unit: mm



### Recommended land pattern size

Unit: mm



### Part numbering system (3.3V0.07F, terminal shaped: HL)

DSK	—	3R3	H	703	T414	—	HL	L
Series code		Rated voltage symbol	Rated capacitance symbol	Additional symbol	Terminal shaped		Taping	

### Standard Ratings

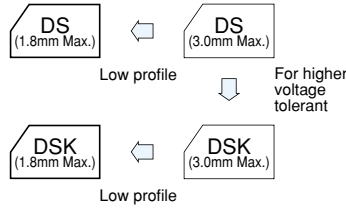
Max. operating voltage(V)	Rated capacitance(F)	ELNA Parts No.	ø DxL(mm)
3.3	0.07	DSK-3R3H703T414-HLL	4.8x1.4

\* Reflow soldering condition : 146 page.

## 1.8mm Max. height Coin Cell Capacitors

GREEN CAP 60°C / 70°C

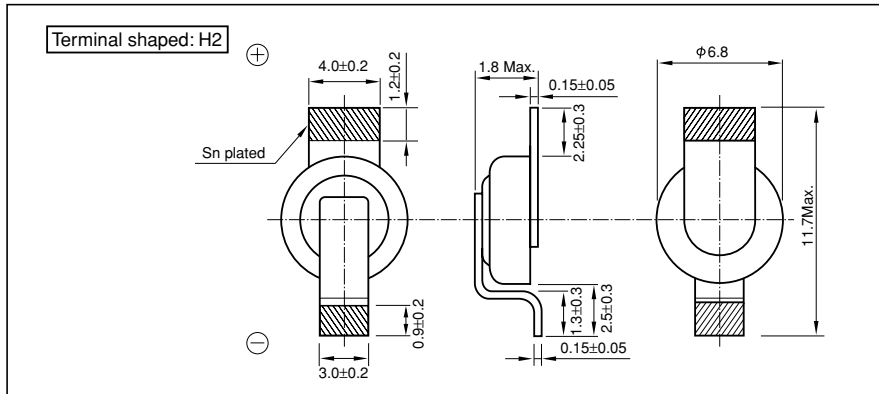
- Reflow soldering method available.
- Unlike batteries, the number of charging/ discharging cycles unlimited and rapid charging/ discharging is possible.
- High reliability, Safe and unlike secondary batteries, this is pollution free devices.
- 1.8mm height type made lineup in the DS, DSK series.



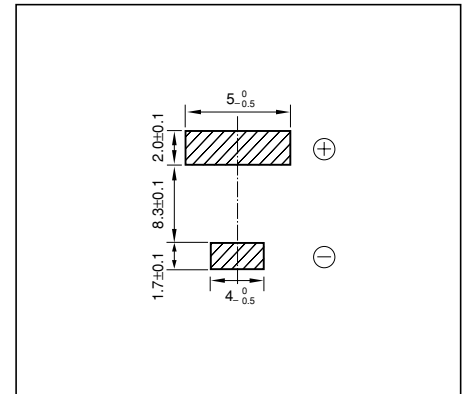
### Specifications

Item	Performance			
Series Name	DS series		DSK series	
Rated voltage (V)	2.5		3.3	
Category temperature range (°C)	-25 to +70		-10 to +60	
Tolerance at rated capacitance (%)	-20 to +80		-20 to +80	
Rated Capacitance (F)	0.2		0.2	
Internal resistance(Ω) at 1 kHz	100		200	
Characteristics at high and low temperature	Percentage of capacitance change	Within ±30% of the value at 20°C	Percentage of capacitance change	Within ±50% of the value at 20°C
	Internal resistance	Less than five times of the value at 20°C	Internal resistance	Within ten times the initial specified value
Endurance	Test temperature	70°C	Test temperature	60°C
	Test time	1000 hours	Test time	1000 hours
	Percentage of capacitance change	Within ±30% of the initial measured value	Percentage of capacitance change	Within ±30% of the initial measured value
	Internal resistance	2kΩ or less	Internal resistance	4kΩ or less
Shelf life	Test time :1000 hours ; Same as endurance.			

### Outline Drawing



### Recommended land pattern size



#### Part numbering system (2.5V0.2F, terminal shaped: H2)

DS	—	2R5	H	204	T614	—	H2	L
Series code		Rated voltage symbol	Rated capacitance symbol	Additional symbol	Terminal shaped		Taping	

#### Part numbering system (3.3V0.2F, terminal shaped: H2)

DSK	—	3R3	H	204	T614	—	H2	L
Series code		Rated voltage symbol	Rated capacitance symbol	Additional symbol	Terminal shaped		Taping	

### Standard Ratings

Max. operating voltage(V)	Rated capacitance(F)	ELNA Parts No.	φ DxL(mm)
2.5	0.2	DS-2R5H204T614-H2L	6.8x1.4
3.3	0.2	DSK-3R3H204T614-H2L	6.8x1.4

\* Reflow soldering condition : 146 page.

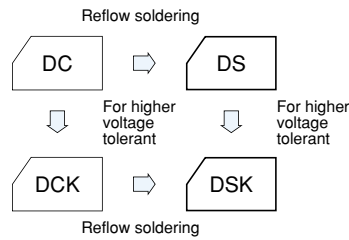
# DS, DSK-621 ELECTRIC DOUBLE LAYER CAPACITORS "DYNACAP"

ELNA®

## Coin Cell Capacitors

GREEN CAP 60°C / 70°C

- Reflow soldering method available.
- Unlike batteries, the number of charging/ discharging cycles unlimited and rapid charging/ discharging is possible.
- High reliability, Safe and unlike secondary batteries, this is pollution free devices.

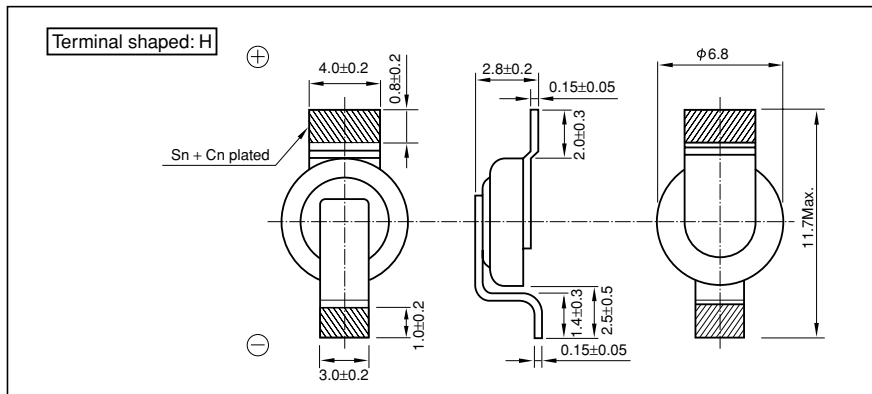


## Specifications

Item	Performance			
	DS series		DSK series	
Series Name	DS series		DSK series	
Rated voltage (V)	2.5		3.3	
Category temperature range (°C)	-25 to +70		-10 to +60	
Tolerance at rated capacitance (%)	-20 to +80		-20 to +80	
Rated Capacitance (F)	0.22		0.22	
Internal resistance(Ω) at 1 kHz	100		200	
Characteristics at high and low temperature	Percentage of capacitance change	Within ±30% of the value at 20°C	Percentage of capacitance change	Within ±50% of the value at 20°C
	Internal resistance	Less than five times of the value at 20°C	Internal resistance	Within five times the initial specified value
Endurance	Test temperature	70°C	Test temperature	60°C
	Test time	1000 hours	Test time	1000 hours
	Percentage of capacitance change	Within ±30% of the initial measured value	Percentage of capacitance change	Within ±30% of the initial measured value
	Internal resistance	Within four times of the initial specified value	Internal resistance	Within four times of the initial specified value
Shelf life	Test time :1000 hours ; Same as endurance.			

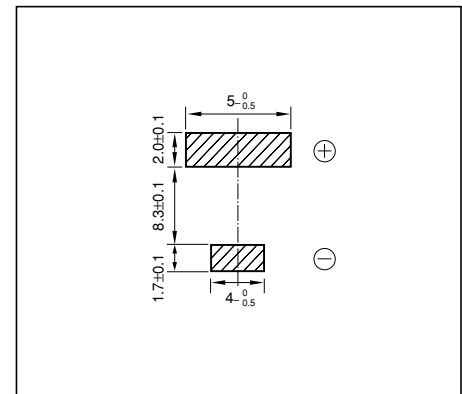
## Outline Drawing

Unit: mm



## Recommended land pattern size

Unit: mm



### Part numbering system (2.5V0.22F, terminal shaped: H)

DS	—	2R5	H	224	□	—	HL
Series code		Rated voltage symbol		Rated capacitance symbol	Additional symbol		

### Part numbering system (3.3V0.22F, terminal shaped: H)

DSK	—	3R3	H	224	□	—	HL
Series code		Rated voltage symbol		Rated capacitance symbol	Additional symbol		

## Standard Ratings

Max. operating voltage(V)	Rated capacitance(F)	ELNA Parts No.	φ DxL(mm)
2.5	0.22	DS-2R5H224U-HL	6.8x2.1
3.3	0.22	DSK-3R3H224U-HL	6.8x2.1

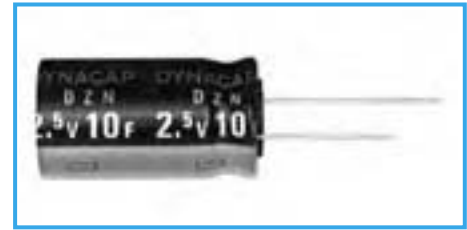
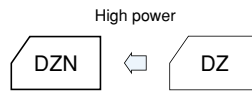
\* Reflow soldering condition : 146 page.



## High power type Capacitors

GREEN CAP 70°C Low ESR 2.5V / 2.7V

- Low internal resistance allows boosting charge and heavy-current discharge. (ampere level)
- Pollution-Free ; with no pollutants such as Cd or Pb.
- Unlimited number of charges and discharges.

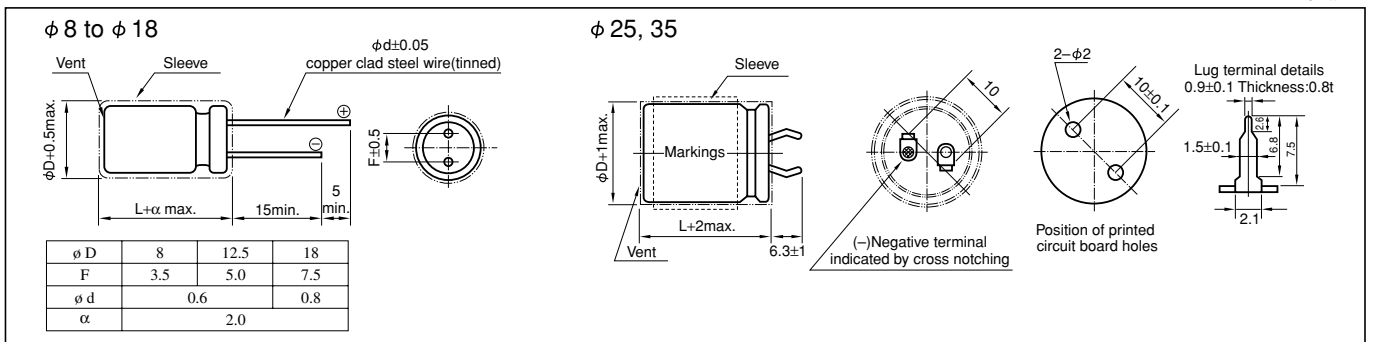


Marking color : White print on a blue sleeve

### Specifications

Item	Performance									
Category temperature range (°C)	-25 to +70									
Tolerance at rated capacitance (%)	-20 to +80									
Internal resistance at 1 kHz	Rated Capacitance (F)	0.7	1.0	3.3	4.7	10	20	50	100	
	Internal resistance (Ω)	0.4	0.3	0.2	0.10	0.10	0.10	0.03	0.03	
Characteristics at high and low temperature	Percentage of capacitance change	Within ±30% of value at 20°C								
	Internal resistance	Less than five times of the value at 20°C								
Endurance (70°C)	Test time	1000 hours								
	Percentage of capacitance change	Within ±30% of the initial measured value								
	Internal resistance	Within four times of the initial specified value								
Shelf life (70°C)	Test time : 1000 hours ; Same as endurance.									

### Outline Drawing



### Standard Ratings (2.5V)

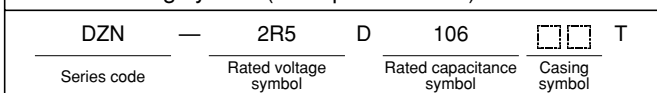
Max. operating voltage(V)	Rated capacitance(F)	Max. Leakage Current(mA) after 24h	ELNA Parts No.	φ DxL(mm)	Internal resistance(mΩ) at 1kHz (measurement value)
2.5	0.7	0.1	DZN-2R5D704G4T	8.0x15.0	200
2.5	1.0	0.1	DZN-2R5D105T	8.0x22.0	100
2.5	3.3	0.2	DZN-2R5D335T	12.5x23.0	40
2.5	4.7	0.3	DZN-2R5D475T	12.5x31.5	30
2.5	10	0.5	DZN-2R5D106T	18.0x35.0	20
2.5	20	0.8	DZN-2R5D206T	18.0x40.0	20
2.5	50	1.0	DZN-2R5D506T	25.0x40.0	15
2.5	100	1.0	DZN-2R5D107T	35.0x50.0	8

### Standard Ratings (2.7V)

Max. operating voltage(V)	Rated capacitance(F)	Max. Leakage Current(mA) after 24h	ELNA Parts No.	φ DxL(mm)	Internal resistance(mΩ) at 1kHz (measurement value)
2.7	1.0	0.2	DZN-2R7D105G5T	8.0x22.0	120
2.7	3.3	0.3	DZN-2R7D335Z6T	12.5x23.0	50
2.7	4.7	0.4	DZN-2R7D475Z7T	12.5x31.5	40
2.7	10	0.6	DZN-2R7D106K8T	18.0x35.0	20
2.7	20	1.0	DZN-2R7D206K9T	18.0x40.0	20

\* Internal resistance are not guaranteed values, but measurement value.  
 \* We tailor packaged product in series and parallel arrangements according to voltage and capacitance as required.

### Part numbering system (example: 2.5V10F)





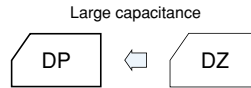
**Large capacitance, High energy type Capacitors**

GREEN CAP 60°C Low ESR

- Most suitable for energy storage and power applications with high capacity and low resistance.
- Terminals arranged in the same orientation provide easy connection.
- Unlike batteries, safe and high reliability without containing active and hazardous substances.
- Unlike batteries, excellent charge and discharge characteristics with no chemical reactions.



Marking color : White print on a black sleeve



**Specifications**

Item	Performance	
Category temperature range (°C)	-25 to +60	
Tolerance at rated capacitance (%)	-20 to +20	
Internal resistance at 1 kHz	Rated Capacitance (F)	500      600
	Internal resistance (mΩ)	12      10
Characteristics at high and low temperature	Percentage of capacitance change	Within ±30% of value at 20°C
	Internal resistance	Less than five times of the value at 20°C
Endurance (60°C)	Test time	2000 hours
	Percentage of capacitance change	Within ±30% of the initial measured value
	Internal resistance	Within four times of the initial specified value
Shelf life (60°C)	Test time :2000 hours ; Same as endurance.	

**Outline Drawing**

Unit: mm

Capacitance	500F	600F
φ D	35.0	35.0
L	85.0	105.0
F	12.7	12.7

**Standard Ratings**

Max. operating voltage(V)	Rated capacitance(F)	ELNA Parts No.	φ DxL(mm)	Internal resistance(mΩ) at 1kHz (measurement value)
2.5	500	DP-2R5D507A85	35.0x85.0	4.0
2.5	600	DP-2R5D607AA5	35.0x105.0	3.2

\* Internal resistance are not guaranteed values, but measurement value.  
 \* We tailor packaged product in series and parallel arrangements according to voltage and capacitance as required.

Part numbering system (example: 2.5V600F)

DP	—	2R5	D	607	AA5
Series code		Rated voltage symbol		Rated capacitance symbol	Casing symbol

### 1 Description of Electric Double Layer Capacitor

#### 1-1 Basic Concepts

Generally capacitors are constructed with a dielectric placed between opposed electrodes, functioning as capacitors by accumulating charges in the dielectric material. Aluminum electrolytic and tantalum electrolytic capacitors, for example, use an aluminum oxide film and a tantalum oxide film as the dielectric, respectively.

On the other hand, Electric Double Layer Capacitors have no visible dielectric in a general sense but utilize the state referred to as the electric double layer, which is developed naturally on the interface between substances, as the function of dielectric.

#### 1-2 Operating Principle

The Electric Double Layer represents the state in which positive and negative charges exist at a very short distance on the boundary where contact occurs between two different substances (e.g. solid and liquid). By externally applying a voltage below a certain voltage to the boundary, higher charges can be accumulated. Accordingly, charge and discharge of electric double layer capacitors utilize adsorption and desorption of ions to the ionic adsorption layer (Electric Double Layer) formed on the electrode surface of the activated carbon used for electrodes.

Applying DC voltage externally across the electrodes of the Electric Double Layer allows almost no passage of current up to a certain voltage, exhibiting a condition like insulation.

However, the application of voltages exceeding the certain voltage causes electrolysis to occur in the electrolyte, resulting in abrupt passage of current.

This voltage determines the resistance of voltage of an Electric Double Layer Capacitor. We use an organic electrolyte and its standard electrolysis occurs at the voltage of about 2.5~3V.

#### 1-3 Advantages and Disadvantages of Electric Double Layer Capacitor

##### [Advantages]

- (1) Small size and capacitance in farads (F) available by utilizing the activated carbon electrode with a large surface area
- (2) No special charging circuit and constrains during discharge are required.
- (3) No effect on the life through overcharging and overdischarging
- (4) Environmentally clean energy

##### [Disadvantage]

- (1) The life is limited due to the use of electrolyte.
- (2) Serial connection is required when used with a low resistance of voltage at a high voltage.
- (3) Cannot be used in AC circuits due to high internal resistance unlike aluminum electrolytic capacitors.

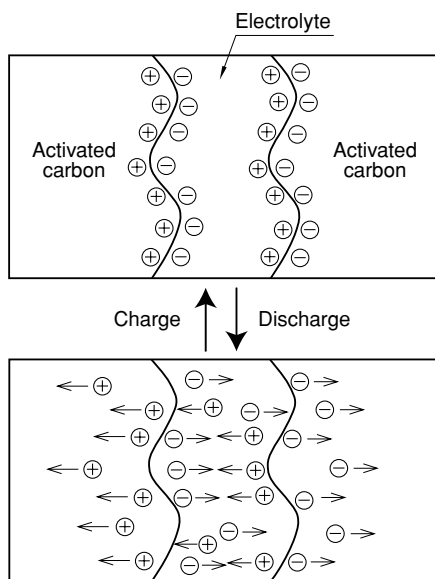


Fig.1 Schematic of Principle of Electric Double Layer Capacitor

**1-4 Construction of DYNACAP**

The basic cell construction of the DB, DBN, DX, DXJ, DH, DK, DBJ, DC, DCK, DS, and DSK series is similar to that of coin-type batteries as shown in Fig.2. DYNACAP contains a single cell or two to three cells stacked in series.

Since these series have a large electrode-to-electrode distance and a small electrode area exhibiting a large internal resistance, they are suitable for the memory backup application that involves microcurrent discharge.

The cylindrical cell construction as seen in the DZ and DZN series has the construction similar to that of aluminum electrolytic capacitors as shown in Fig.3.

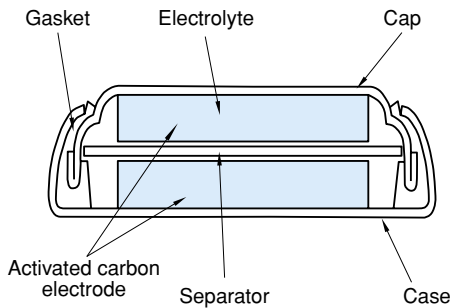


Fig.2 Example of Basic Construction of Coin Cell

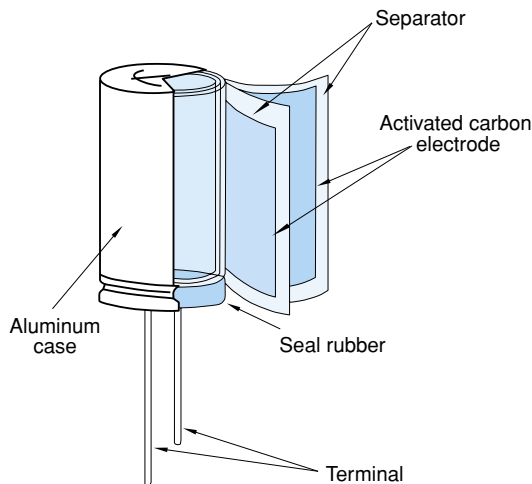


Fig.3 Example of Basic Construction of Cylindrical Cell

These series have a small electrode-to-electrode distance, allowing a large electrode area because of the winding structure. This decreases the internal resistance, which is primary suitable for applications requiring high-power such as motor drive and LED lighting that need high currents.

**2 Description of Life Expectancy**

Generally, the life of Electric Double Layer Capacitors is largely affected by the ambient temperature.

The expected life is approximated by the equation as shown below:

$$L = L_0 \times 2^{\left(\frac{T_0 - T}{10}\right)}$$

Where,

- L : Expected lifetime at temperature T
- L<sub>0</sub> : Lifetime at temperature T<sub>0</sub>
- T : Expected working temperature
- T<sub>0</sub> : Upper category temperature

Note that the above equation does not cover charge and discharge. In the case of charge and discharge, heat generation occurs inside a capacitor; the temperature rise by this heat generation must also be considered.

### 3 Calculation Method of Discharge Time

#### 3-1 Approximating the Discharge Time of Basic Constant Current Discharge

The discharge time at the constant current of a capacitor can be calculated by the following equation.

$$t = (C \times \Delta V) / I$$

Where,

- t : Discharge time (sec.)
- C : Capacitor capacitance (F)
- $\Delta V$  : Working voltage range (V)
- I : Discharge current (A)

As an example, we calculate the discharge time when a capacitor of the DB series 5.5V 1F is charged with 5V and discharged to 3V at a constant current of 1 mA. Since the working voltage range  $\Delta V$  is 2V from 5 - 3V,  $t = (1F \times 2V)/0.001A$  from the above equation, and the discharge time can be calculated as 2,000 seconds (about 33 minutes). Note that the actual discharge time may be different because this equation does not cover the effect of the self-discharge and the IR drop by internal resistance described below.

#### 3-2 Effect of Self-discharge at Microcurrents

When backup is made by discharge with a micro-current below some  $\mu A$  especially for the memory backup application and the like, the discharge time must be determined while taking into account the self-discharge as shown in Fig.4.

The value closer to the actual discharge curve is obtained by adding the voltage drop through the self-discharge determined from the voltage retention characteristic test to the discharge curve given by calculation.

Note that the value of self-discharge varies by the charge time, charging current and an ambient temperature.

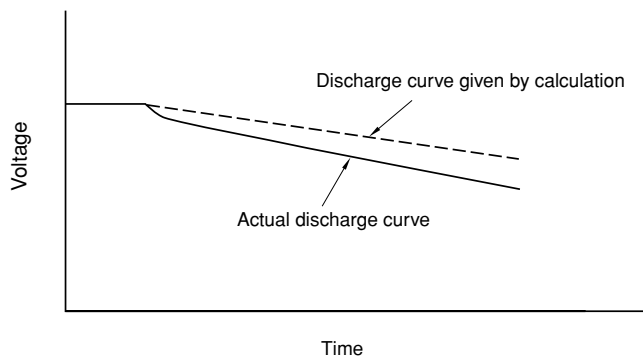


Fig.4 Example of Discharge Curve involving Self-Discharge

#### 3-3 Effect of IR Drop at High Currents

When a high Current discharge and a capacitor with a large internal resistance are used, the effect of IR drop by the product of the internal resistance and the current must be considered as shown in Fig.5.

When a high current is required in a very short time, or a high instantaneous current flows at the start of discharge, the voltage drop indicated with  $\Delta V1$  counts. However, when the discharge continues as it is, the discharge curve indicates in a manner showing a slow diffusion and then keeps a constant straight line.

We also make calculation including  $\Delta V2$  of the intersection extending from the initial discharge and the discharge straight line section including the diffusion curve when indicating the DC internal resistance.

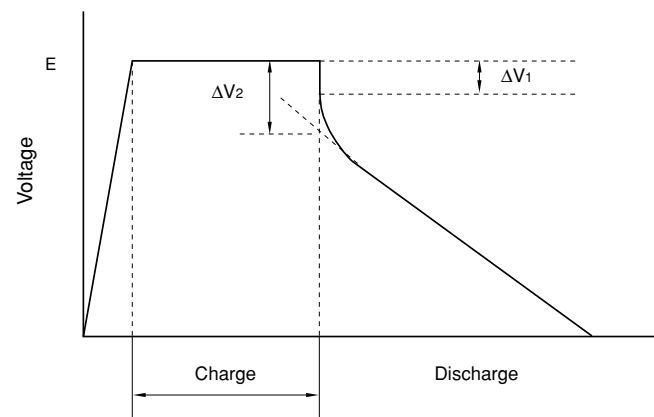


Fig.5 Example of Discharge Curve involving IR Drop

Due to IR drop, the shape of the discharge curve varies by the internal resistance and ambient temperature for each series.

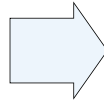
**4 Series-parallel connection modularization**

Electric Double Layer Capacitors have a low operating voltage per cell.

To deal with this, ELNA is ready to offer series module for high operating voltages to meet to various needs.

Please consult with us on optimization and design.

Packaged item

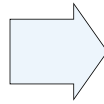


Example of packaged item

In case of a low voltage (up to about 24 V) for the DZ and DZN series with relatively low capacitance, we are preparing simple packaged products.

No full-scale voltage equalization circuit has been equipped yet, but comparatively low cost and flexible layout can be realized.

Module fitted with voltage equalization circuit



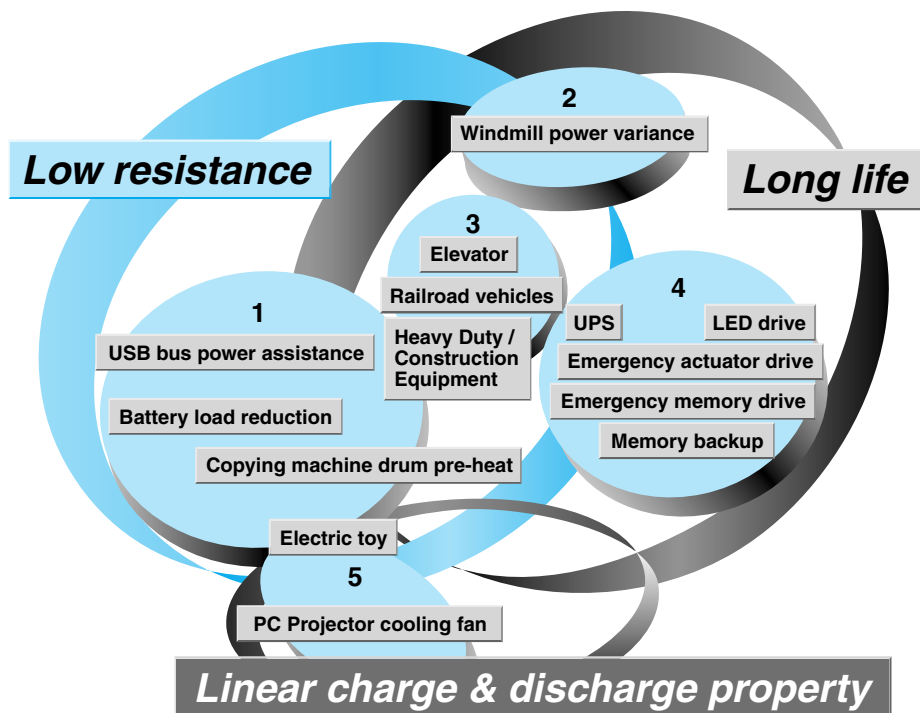
Example of module

The high-capacity DP series can accommodate to the full-scale module that is equipped with a circuit to equalize the voltages between cells.

Adaptable to high operating voltages of several hundred volts.

**5 Applications**

**Features & Benefits of Electric Double Layer Capacitor**



Electric Double Layer Capacitors  
TECHNICAL NOTE

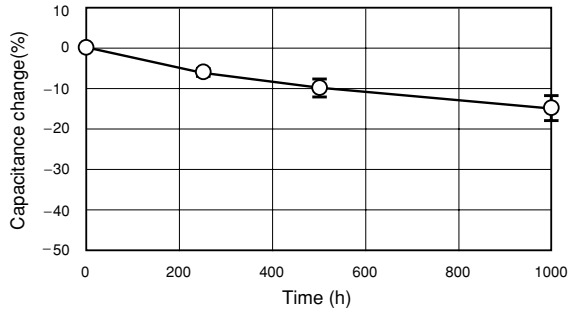
### 6 Electric Characteristics Data

#### 6-1 Coin type for memory back-up

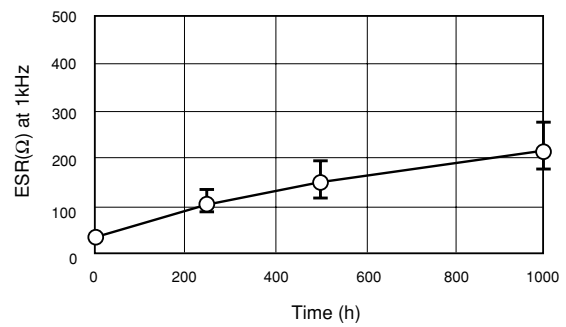
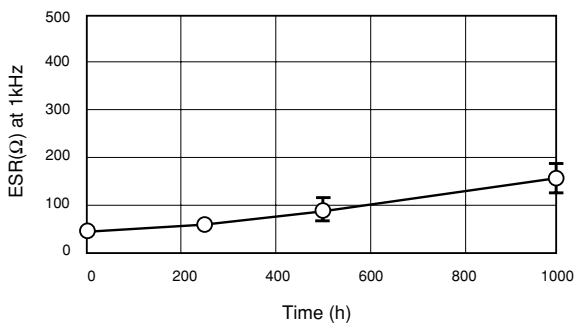
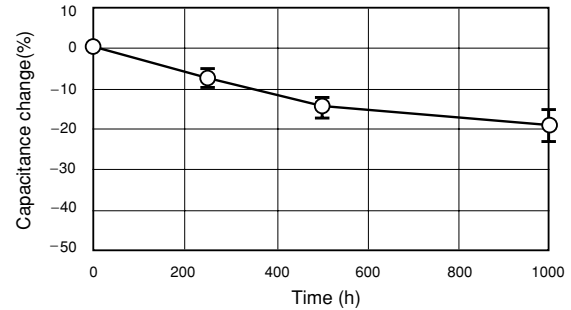
DYNACAP Series DXJ  
5.5V 0.33F/DXJ-5R5H334  $\phi$ 11.5x5L(mm)

DYNACAP Series DSK  
3.3V 0.22F/DSK-3R3H224  $\phi$ 6.8x2.1L(mm)

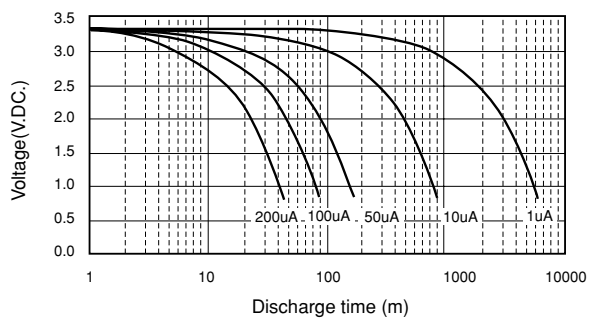
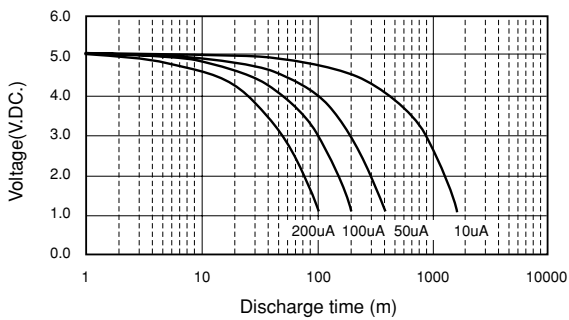
##### ■ Endurance (85°C 5.5V.DC max)



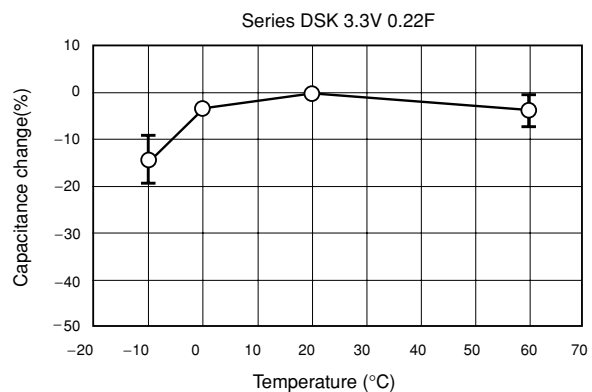
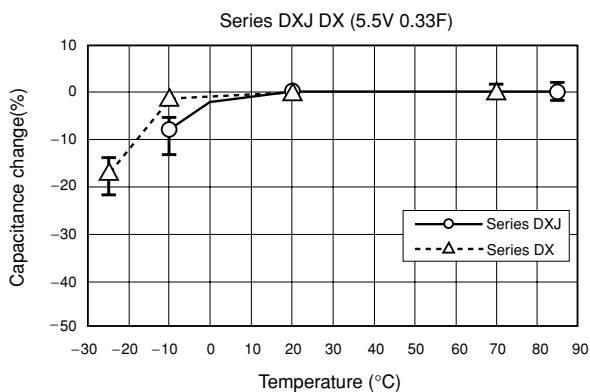
##### ■ Endurance (60°C 3.3V.DC max)



##### ■ Discharge characteristics



##### ■ Characteristics at high and low temperature



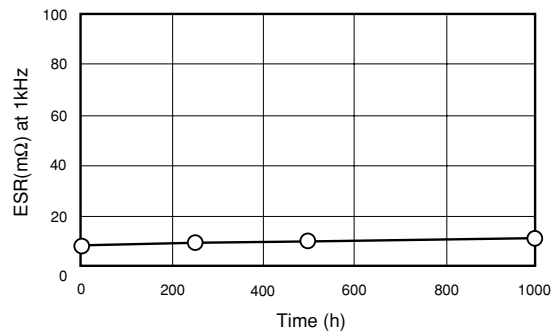
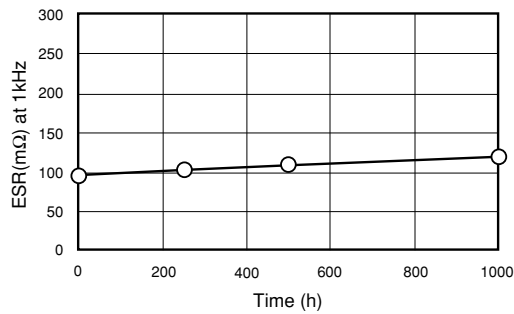
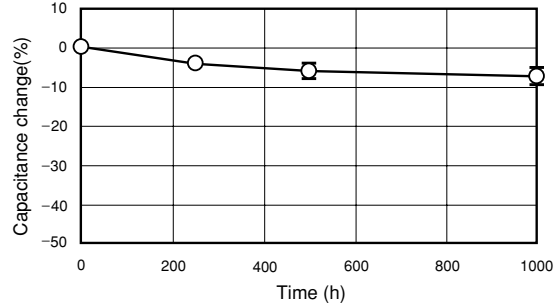
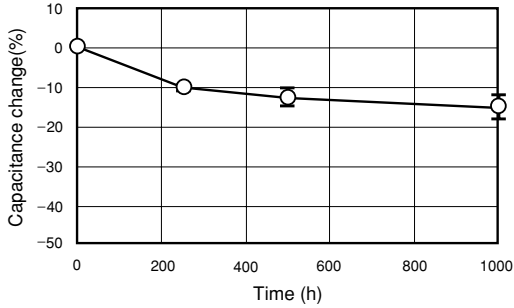
6-2 Cylindrical type for power

DYNACAP Series DZN  
2.5V 1F/DZN-2R5D105T  $\phi 8 \times 22L(mm)$

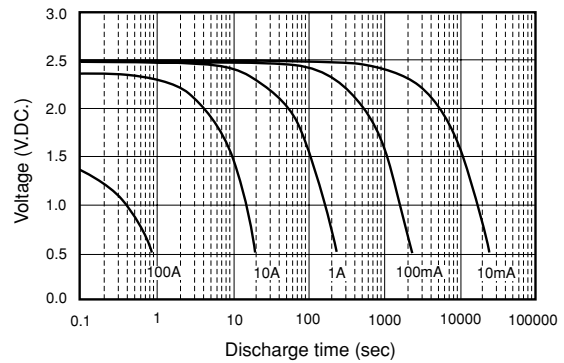
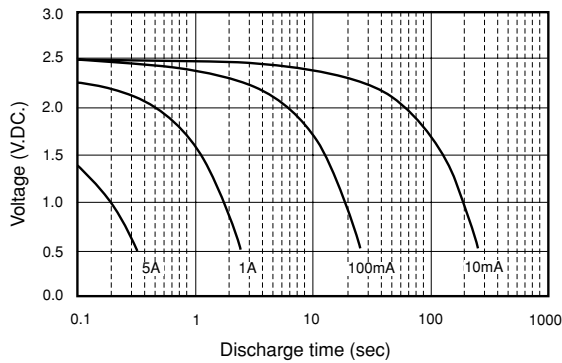
DYNACAP Series DZN  
2.5V 100F/DZN-2R5D107T  $\phi 35 \times 50L(mm)$

■ Endurance (70°C 2.5V.DC max)

■ Endurance (70°C 2.5V.DC max)

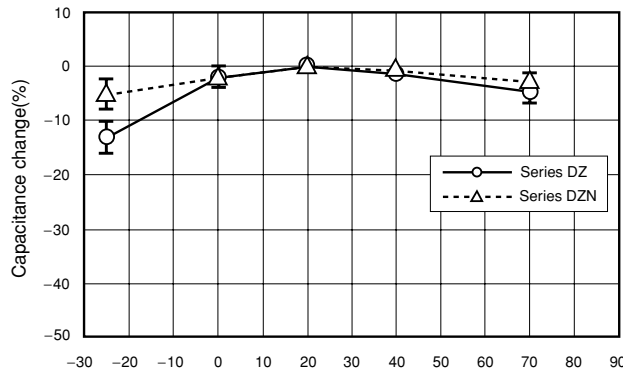


■ Discharge characteristics



■ Characteristics at high and low temperature

Series DZ DZN(2.5V100F)



# ELECTRONIC COMPONENTS

## ELNA CO.,LTD.

<http://www.elna.co.jp/>

**HEAD OFFICE** 3-8-11 Shin-Yokohama,Kouhoku-ku,Yokohama-city, TEL. +81-45-470-7251  
Kanagawa, 222-0033 Japan FAX. +81-45-470-7261

**SHIGA FACTORY** 30 Ta-Torahimecho, Higashiasai-gun, TEL. +81-749-73-3021  
Shiga, 529-0142 Japan FAX. +81-749-73-2175

### ■SALES OFFICE

#### ELNA AMERICA.,INC.

##### HEAD OFFICE

5770 Warland Drive #B  
Cypress, CA 90630, U.S.A.  
Eastern Regional Office  
3600 Dallas Hwy.,Ste.230 #389  
Marietta, GA 30064, U.S.A.

TEL.+1-714-761-8600  
FAX.+1-714-761-9188

TEL.+1-678-261-8284  
FAX.+1-678-815-0892

#### ELNA EUROPE LTD.

Redfields Industrial Park Church Crookham, Fleet  
Hampshire GU52 0RD, U.K.

TEL.+44-1252-858620  
FAX.+44-1252-858625

#### ELNA ELECTRONICS SINGAPORE PTE.LTD.

103 Kallang Avenue,  
#04-01 AIS Industrial Building  
Singapore 339504

TEL.+65-62930181  
FAX.+65-62966716

#### ELNA (HK) CO.,LTD.

Unit 11, 1/F. Mirror Tower,  
61 Mody Road, TST East, Kowloon, Hong Kong

TEL.+852-2723-4285  
FAX.+852-2723-4623

#### ELNA (SHANGHAI) CO.,LTD.

Room 6203, Rui Jin Hotel Business Center 118  
Rui Jin 2 Road, Shanghai, China  
Post Code 200020

TEL.+86-21-64452269  
FAX.+86-21-64452271

#### YOKOHAMA OFFICE

3-8-11 Shin-Yokohama,Kouhoku-ku,Yokohama-city  
Kanagawa, 222-0033 Japan

TEL.+81-45-470-7254  
FAX.+81-45-470-7260

#### OSAKA OFFICE

6-1-15 Nishinakajima Yodogawa-ku,  
Osaka-city, Osaka, 532-0011 Japan

TEL.+81-6-6304-6831  
FAX.+81-6-6304-8638

#### ANJO OFFICE

2-4-6, Mikawa-Anjo-Honmachi,  
Anjo-city, Aichi, 446-0059 Japan

TEL.+81-566-72-8055  
FAX.+81-566-72-1125

#### TOHOKU OFFICE

58-2 Aza-Meijimachi,Taira-yanagase Iwaki-city  
Fukushima, 970-8036 Japan

TEL.+81-246-37-7062  
FAX.+81-246-37-7064

#### SHIRAKAWA OFFICE

9-32 Aza-sugiyama, Oaza-yone, Nishigo-mura,  
Nishishirakawa-gun, Fukushima, 961-8031 Japan

TEL.+81-248-25-5601  
FAX.+81-248-25-5614

#### ELNA COMPONENTS CO.,LTD.

2040-1 Kurami Samukawa-cho  
Kouza-gun, Kanagawa, 253-0101 Japan

TEL.+81-467-73-0261  
FAX.+81-467-72-0615

### ■AFFILIATED COMPANY

#### TANIN ELNA CO.,LTD.

##### HEAD OFFICE

88.90. Chalermphrakiat Rama 9 Road,  
Nongborn, Pravet, Bangkok 10250, Thailand

TEL.+66-2-3985333  
FAX.+66-2-3985337

##### CHIANGMAI FACTORY

56 Mahidoal Road T.Sutep  
A.Muang Chiangmai 50200, Thailand.

TEL.+66-53-270206  
FAX.+66-53-275064

#### ELNA-SONIC SDN.BHD.

2473, Tingkat Perusahaan 6,  
Free Trade Zone, Prai Industrial Estate,  
13600 Prai, Penang, Malaysia.

Sales office

TEL.+60-4-3992916  
FAX.+60-4-3992925  
TEL.+60-4-3985369

#### ELNA-LELON ELECTRONICS (SUZHOU) CO.,LTD.

1178, Zhongshan N.Rd., Songling-town,  
Wujiang-city, Jiangsu, China  
Post Code 215200

TEL.+86-512-63459215  
FAX.+86-512-63459216

#### ELNA TOHOKU CO.,LTD.

##### AOMORI FACTORY

1-349-1 Okonoki, Kuroishi-city  
Aomori, 036-0357 Japan

TEL.+81-172-52-4166  
FAX.+81-172-53-4609

##### SHIRAKAWA FACTORY

9-32 Aza-sugiyama, Oaza-yone, Nishigo-mura,  
Nishishirakawa-gun, Fukushima, 961-8031 Japan

TEL.+81-248-25-5601  
FAX.+81-248-25-5614



### CAUTION

Observe the following to  
ensure safe operation.

1. The models and specification values contained in this catalog are for reference purposes only. During actual use or when placing an order, please request "drawings" and make your purchase or use the purchased product based on those drawings.
2. In order to ensure that products are used correctly and safely, always make sure to read the cautions for using prior to using the product.

### NOTE

1. Since the contents contained are subject to changes in specifications, dimensions and so forth without notice due to modification, please confirm the contents when placing an order.  
If any of the matters described here are unclear, please inquire at one of our nearby sales offices.
2. The contents of this catalog are valid as of October 2007. The expiration date of this catalog is September 2008.