



**THE DATASHEET OF  
DCK-3R3E224U-E**



Electronic Components

# High Quality CAPACITORS



## Certifications of Quality Management System (as of Jun. 2008)

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

## Certifications of Environmental Management System (as of Jun. 2008)

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

### 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.

**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 φ8×10 or more. )
	For audio type	Sn-Bi	PET (Apply to the size of φ8×10 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

● Electric double layer capacitors

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

Note : Sn : Tin Bi : Bismuth Cu : Copper

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>	— 19	Aluminum Electrolytic Capacitors With Conductive Polymer Solid Electrolyte
	<b>Chip Type, Miniature and Large Capacitance Aluminum Electrolytic Capacitors</b>	— 29	Chip Type, Miniature and Large Capacitance Aluminum Electrolytic Capacitors
	<b>Aluminum Electrolytic Capacitors for Audio</b>	— 99	Aluminum Electrolytic Capacitors for Audio
<b>2</b>	<b>Electric Double Layer Capacitors “DYNACAP” , “POWERCAP”</b>	— 123	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 φD×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	φ3, φ4	—	—	—	—	—	—	2,000	10,000
	φ5 to φ8×6.7, φ6.3×7.7	—	—	—	—	—	—	1,000	5,000
	φ8×10, φ10×7.7 to 10.5	—	—	—	—	—	—	500	2,000
	φ12.5×13.5	—	—	—	—	—	—	200	1,000
	φ12.5×17.5	—	—	—	—	—	—	150	750
	9.5×19 to 24	—	—	—	—	—	—	400	(2,000)
04 Type	φ3×5	200	2,000	200	5,000	2,000	20,000	—	—
	φ4 to φ5×5, φ4×7	200	2,000	200	5,000	2,000	20,000	—	—
	φ5×7	200	2,000	200	4,000	2,000	20,000	—	—
	φ6.3×5, φ6.3×7	200	2,000	200	2,000	2,000	20,000	—	—
	φ8×5 to 7	200	2,000	200	2,000	1,000	10,000	—	—
	φ5 to 6.3×11, 11.5	200	2,000	200	2,000	2,000	20,000	—	—
	φ8×11.5,12	200	2,000	200	2,000	1,000	10,000	—	—
	φ8×15	200	1,000	200	2,000	1,000	8,000	—	—
	φ8×20	200	1,000	200	1,000	1,000	8,000	—	—
	φ10×12.5	200	1,000	200	2,000	500	5,000	—	—
	φ10×16	200	1,000	200	1,000	500	5,000	—	—
	φ10×20	200	1,000	100	500	500	4,000	—	—
	φ10×25 to 30	200	1,000	100	500	500	3,000	—	—
	φ12.5×15	100	1,000	100	500	500	4,000	—	—
	φ12.5×20 to 25	100	500	100	1,000	500	4,000	—	—
	φ12.5×30 to 35	100	500	200	2,000	500	3,000	—	—
	φ12.5×40	100	500	200	2,000	—	—	—	—
	φ16×16	100	500	100	1,000	250	2,000	—	—
	φ16×20	100	500	100	1,000	250	2,000	—	—
	φ16×25	100	500	100	1,000	250	1,500	—	—
φ16×31.5	50	200	100	1,000	250	1,500	—	—	
φ16×35.5	50	200	100	1,000	250	1,500	—	—	
φ16×40	50	100	100	800	—	—	—	—	
φ18×16 to 20	100	100	100	1,000	250	1,500	—	—	
φ18×25 to 31.5	50	100	100	1,000	250	1,500	—	—	
φ18×35.5 to 40	50	250	100	800	—	—	—	—	

69□ Type	φ22 to φ35	—	50 or 100*
621 Type			

### 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	φ11.5	100	4,000	—	—	750	6,000	—	—
DX-H, DX-V, DXJ-H, DXJ-V	φ11.5	—	—	200	8,000	—	—	—	—
DX-V	φ19	—	—	100	2,000	—	—	—	—
DH, DB, DK, DBN, DBJ	φ13.5	—	—	200	4,000	—	—	—	—
	φ21.5	—	—	100	2,000	—	—	—	—
DC, DCK	φ6.8	—	—	200	24,000	—	—	—	—
DS, DSK	φ4.8	—	—	—	—	—	—	2,000	10,000
	φ6.8	—	—	—	—	—	—	1,500 to 2,000*	6,000 to 10,000*
DZ DZN DZH	φ8	200	1,000	—	—	—	—	—	—
	φ12.5×23	100	500	—	—	—	—	—	—
	φ12.5×31.5	100	500	—	—	—	—	—	—
	φ18	50	250	—	—	—	—	—	—
	φ25	—	50 or 100*	—	—	—	—	—	—
DP	φ35	—	50 or 100*	—	—	—	—	—	—
	φ35	—	50	—	—	—	—	—	—
	φ51	—	32	—	—	—	—	—	—

\* Please inquire.

**NOTE**

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



## Aluminum Electrolytic Capacitors

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## ■ Type List for Miniature and Chip Type Aluminum Electrolytic Capacitors

○: Apply to those capacitors with rated voltage of 250V or less.

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												
Polymer	PVX	23	Ultra Low ESR Conductive Polymer Chip		•				•	•	•	+105	-55	10	2.5	100 to 1200	Silver	32		
	PVM	25	Super Low ESR Conductive Polymer Chip		•				•	•	•	+105	-55	16	2.5	33 to 1200	Silver	32		
	PVH	27	Low ESR Conductive Polymer Chip		•				•	•	•	+105	-55	25	2.5	10 to 1000	Silver	32		
	PVO	—	For Audio, Conductive Polymer Chip		•				•	•	•	+105	-55	25	4	6.8 to 470	Silver	32		
Surface Mounting Type	RV2	34	5.5mm L	•								+85	-40	50	4	0.1 to 220	Silver	32		
	RV	35	Higher Capacitance Range									+85	-40	100	6.3	10 to 1000	Silver Brown	32		
	RV	36	Large size, Higher Capacitance Range									+85	-40	100	6.3	100 to 3300	Brown	32		
	RV3	37	High CV	•								+85	-40	50	6.3	4.7 to 330	Silver	32		
	RV4	38	4.5mm L	•								+85	-40	50	6.3	0.1 to 100	Silver	32		
	RV5	39	High CV	•								+85	-40	100	6.3	2.2 to 1500	Silver Brown	32		
	RVB	41	Non Polarized	•								+85	-40	50	6.3	0.1 to 47	Silver	32		
	RVS	42	105°C, 5.5mm L	•	•							+105	-55	50	6.3	0.1 to 100	Silver	32		
	RVL	43	Long Life, 105°C, 6.0mm L	•	•							+105	-55	50	6.3	0.1 to 100	Silver	32		
	RVJ	44	105°C, Higher Capacitance		•							+105	-55	100	6.3	10 to 1000	Silver Brown	32		
	RVJ	45	105°C, Large size, Higher Capacitance Range				•					+105	-55	100	6.3	47 to 1000	Brown	32		
	RVH	46	105°C, Low Impedance		•			•				+105	-55	35	6.3	47 to 470	Brown	32		
	RVC	47	105°C, 3000h/5000h				•	•				+105	-40	50	6.3	0.1 to 1000	Silver	32		
	RVD	49	105°C, Low Impedance, Long life		•	•			•			+105	-55	50	6.3	4.7 to 1500	Silver	32		
	RVZ	51	105°C, Low Impedance		•				•			+105	-55	35	6.3	4.7 to 1500	Silver Brown	32		
	RVK	53	125°C, Higher Reliability				•					+125	-40	63	10	10 to 330	Brown	32		
	RVK	54	125°C, Large size, Higher Capacitance Range					•				+125	-40	6.3	10	100 to 1000	Brown	32		
	RTJ	55	105°C, Higher Capacitance, Vibration resistance		•							+105	-55	100	6.3	10 to 470	Brown	32		
RTH	56	105°C, Low Impedance, Vibration resistance		•				•			+105	-55	35	6.3	47 to 470	Brown	32			
RTK	57	125°C, Vibration resistance				•					+125	-40	63	10	10 to 330	Brown	32			
RYK	58	125°C, Horizontal type			•						+125	-40	63	6.3	56 to 820	Black Blue	04			
Ultra-miniature Type	RC3	59	5mm L, Standard	•							+85	-40	50	4	0.1 to 470	Black Blue	04			
	R3S	60	5mm L, 105°C	•	•							+105	-55	50	6.3	0.1 to 100	Black	04		
	RB3	61	5mm L, Bipolar	•								+85	-40	50	6.3	0.1 to 47	Blue	04		
	RC2	62	7mm L, Standard	•								+85	-40	100	4	0.1 to 330	Blue	04		
	R2S	63	7mm L, 105°C	•	•							+105	-55	50	6.3	0.1 to 100	Black	04		
	RB2	64	7mm L, Bipolar	•								+85	-40	50	6.3	0.1 to 47	Blue	04		
Standard Type	RE3	65	Miniaturized Standard	•								+85	-40	450	6.3	0.1 to 22000	Blue	04		
	R2B	67	Bipolarity Standard									+85	-40	100	6.3	0.1 to 4700	Blue	04		
	RJ5	68	105°C, Miniaturized, High CV	•	•							+105	-40	100	6.3	0.1 to 22000	Black	04		
	RJ4	70	105°C, Miniaturized	•	•							+105	-55	100	6.3	0.1 to 22000	Black	04		
	RJ3	72	105°C, Low Impedance		•							+105	-55	100	6.3	0.1 to 15000	Black	04		
High Reliability Type	RJJ	—	105°C, Low Impedance				•	•				+105	-55	100	6.3	0.47 to 15000	Black	04		
	RJH	74	105°C, Extra Low Impedance				•	•				+105	-55	100	6.3	0.47 to 15000	Black	04		
	RJB	77	105°C, Low Impedance, Miniaturized				•	•				+105	-55	100	6.3	0.47 to 10000	Black	04		
	RJF	79	105°C, Extra Low Impedance, Miniaturized				•	•				+105	-40	100	6.3	6.8 to 6800	Black	04		
	RJL	82	105°C, Long life, Low impedance	•			•	•	•			+105	-40	100	6.3	6.8 to 6800	Black	04		
	RK	84	125°C, Longevity				•	•				+125	-40	63	10	47 to 3300	Black	04		
Special Type	RLB	86	Low-leakage Current								+85	-40	50	6.3	0.47 to 2200	Blue	692			

NOTE

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

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	Rework Soldering Resistance	Max.	Min.	Max.	Min.						
					1000hrs	2000hrs	3000hrs	5000hrs	10000hrs														
Large Capacitance Type	LA5	87	PCB Snap-In Miniaturization	•												+85 +85	-40 -25	400 450	10 —	56 to 82000 47 to 470	Black	—	
	LH7	—														+85	-40	200	16	470 to 15000	Black	692	
	L3J	—	105°C, Standard		•											+105 +105	-40 -25	200 400	10 250	150 to 22000 39 to 820	Black	692	
	LAG	89	High-Reliability, Standard	•	•											+105	-25	400	160	56 to 1800	Black	692	
	LAH	91	Miniaturized, High Ripple	•	•											+105	-25	450	16	56 to 47000	Black	692	
	LAT	94	Ultra Miniaturization, High Ripple	•	•											+105	-25	400	160	82 to 2700	Black	692	
	LAZ	96	High-Reliability, High Ripple, Long Life	•		•										+105	-25	450	16	56 to 47000	Black	692	
	LAV	—	105°C, Compatible with VDE		•											+105	-25	250	—	82 to 1000	Black	692	
	LUH	—	105°C, Durable against Over Voltage		•											+105	-25	400	200	68 to 1500	Black	692	
LAX	98	105°C, Ultra Long Life	•			•									+105	-25	400	160	56 to 1800	Black			
For Audio	RVO	100	Chip Type (PURECAP)	•						•	•	+85	-40	50	6.3	0.1 to 1000			0.1 to 1000	Silver Brown	32		
	RVW	101	Chip Type 105°C (PURECAP)	•	•					•	•	+105	-40	50	6.3	0.1 to 1000			0.1 to 1000	Silver Brown	32		
	RVG	102	Chip Type	•						•	•	+85	-40	35	6.3	3.3 to 470			3.3 to 470	Silver	32		
	RFS	103	High Grade (SILMIC I)							•		+85	-55	100	6.3	0.47 to 3300			0.47 to 3300		04		
	ROS	104	High Grade (SILMIC)							•		+85	-40	100	16	2.2 to 4700			2.2 to 4700		04		
	ROA	—	High Grade (Cerafine)							•		+85	-40	100	6.3	0.47 to 6800			0.47 to 6800		04		
	ROB	105	Miniaturized Standard (TONEREX)							•		+85	-40	100	6.3	0.47 to 10000			0.47 to 10000		04		
	R2A	106	7mm L	•						•		+85	-40	50	4	0.1 to 330			0.1 to 330		04		
	R3A	107	5mm L	•						•		+85	-40	50	4	0.1 to 220			0.1 to 220		04		
	RFO	108	Standard (PURECAP)	•						•		+85	-40	100	6.3	0.47 to 15000			0.47 to 15000		04		
	RA3	109	Miniaturized Standard	•						•		+85	-40	100	6.3	0.1 to 22000			0.1 to 22000		04		
	RBD	110	Miniaturized Bipolar	•						•		+85	-40	100	6.3	0.1 to 4700			0.1 to 4700		04		
LAO	111	For Audio (TONEREX)							•		+85	-40	50	16	680 to 10000			680 to 10000		692			

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

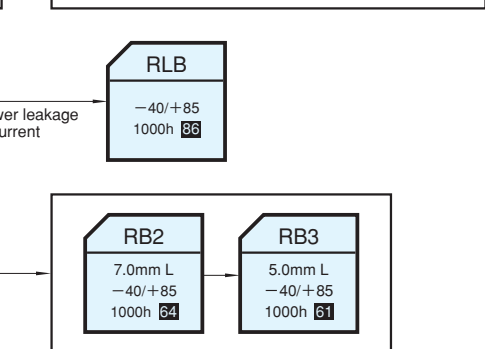
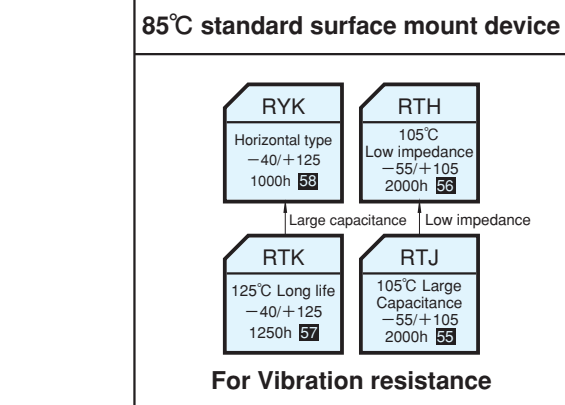
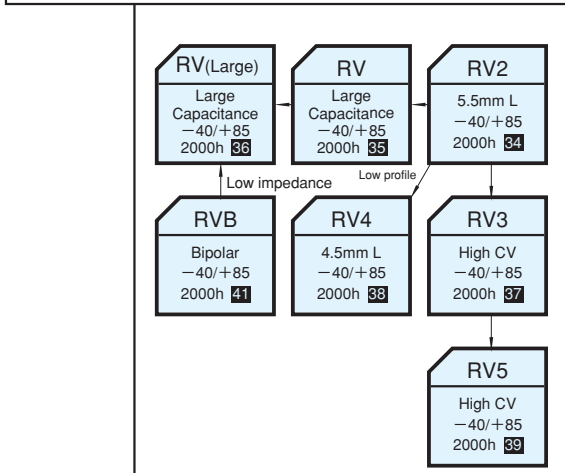
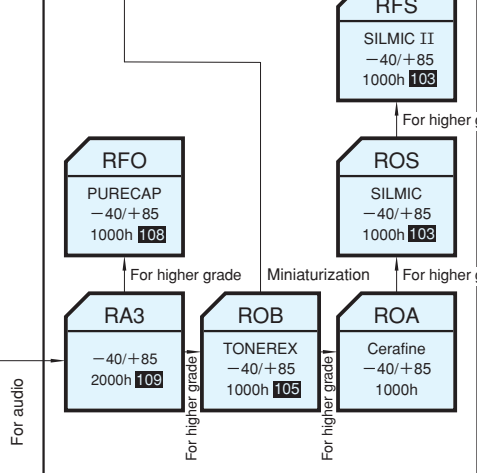
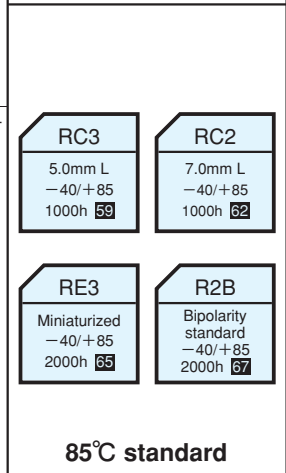
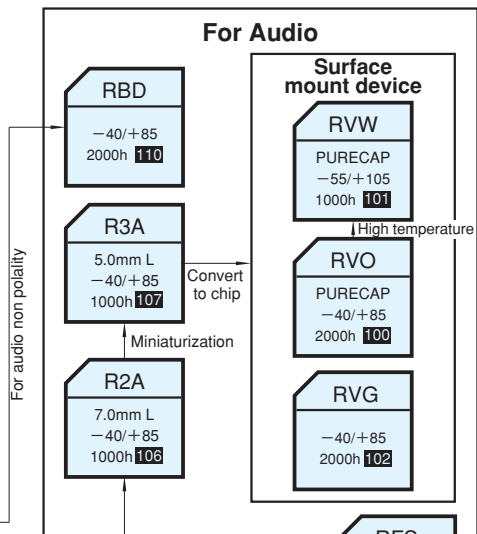
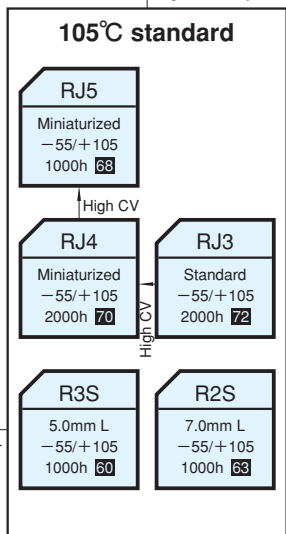
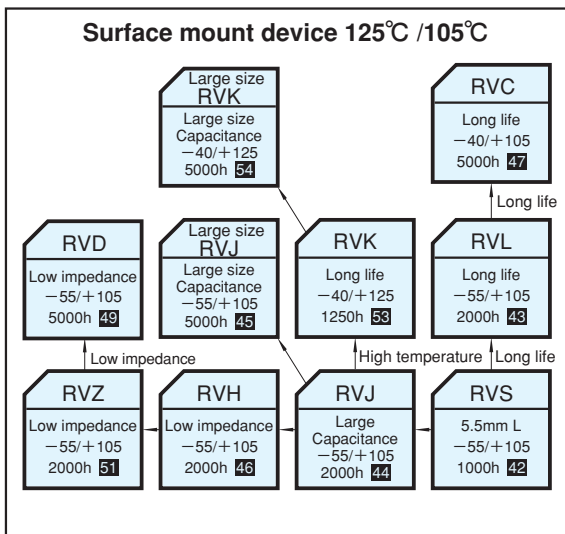
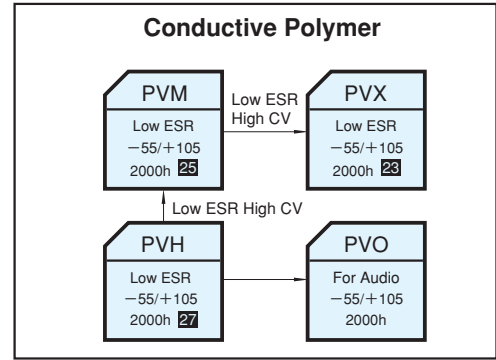
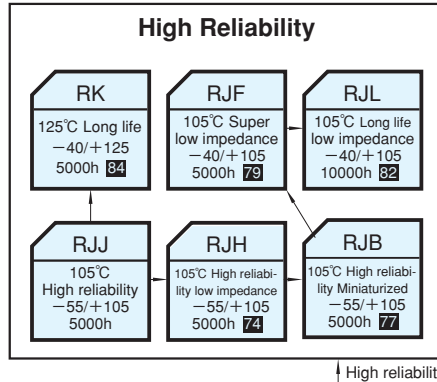
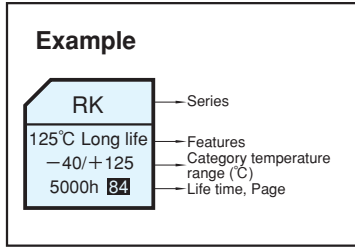
Old series were deleted from catalog, the productions were discontinued.

For new designation, please use the substitute series.

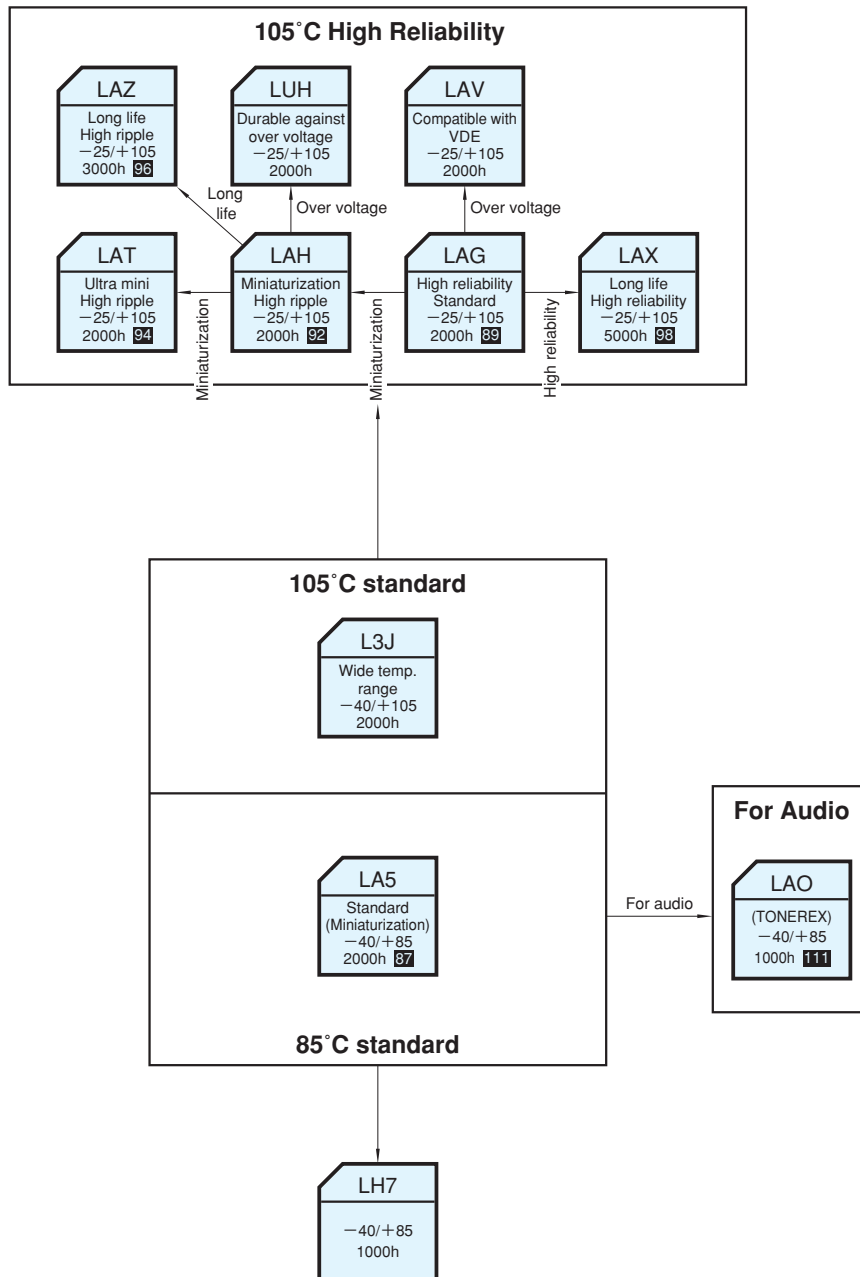
It is greatly appreciated that you would understand and accept the proposal stated in above.

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	84
	RKA	04	130°C Long Life	Consult us	—
Large capacitance type	LP5	692	PCB terminal, Snap-in type	LA5	87
	L3J	692	105°C Standard	LAH	91
	LPG	692	High reliability, High ripple	LAG	89
	LPH	692	High reliability, Ultra-miniaturized	LAH	91
	LPT	692	Super-miniaturized, High ripple	LAT	94
	LUV	692	105°C Compatible with VDE	LAV	—
	LPX	692	105°C Ultra-long Life	LAX	98
For Audio	ROS (φ22 to 30)	04	High grade (SILMIC)	Consult us	—
	R2O	04	Miniaturized Standard	Consult us	—
	R2A	04	Standard	Consult us	—

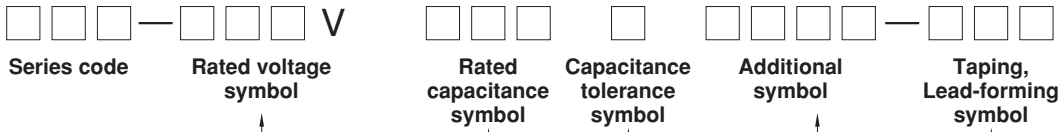
■ Systematized Classification of Miniature and Chip Type Aluminum Electrolytic Capacitors



**Systematized Classification of Large Aluminum Electrolytic Capacitors**



■ Product Symbol System for Aluminum Electrolytic Capacitors



Write down the rated voltage itself; however, write 6 for 6.3WV.

Tolerance on Capacitance	Symbol
±10%	K
±20%	M
-10 to +30%	Q
-10 to +50%	T

Write down one of the forming symbols given on page 15 to 17 for taping and lead-forming capacitors. When taping or lead-forming is not necessary, leave the boxes blank.

Rated capacitance (µF)	Symbol
0.1	R10
1	010
2.2	2R2
33	330
100	101
2200	222
33000	333
470000	474

Additional symbols for denoting the case symbols and others. Refer to the examples given on the page for each series. Pb free item : Addition “#” or “U”.

■ Recommended soldering conditions

● Standard type (Lead free)

(1) Methods

See the following

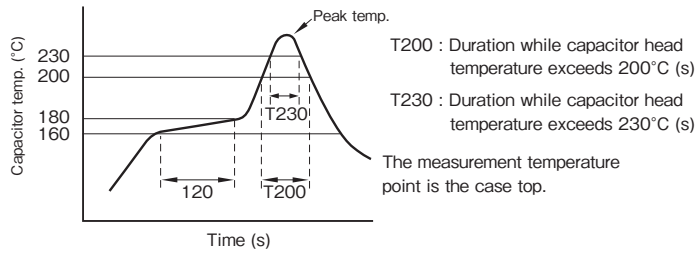
Methods	Reflow soldering	Soldering iron	Flow soldering
Advisability	○	○	×

(2) Soldering iron conditions

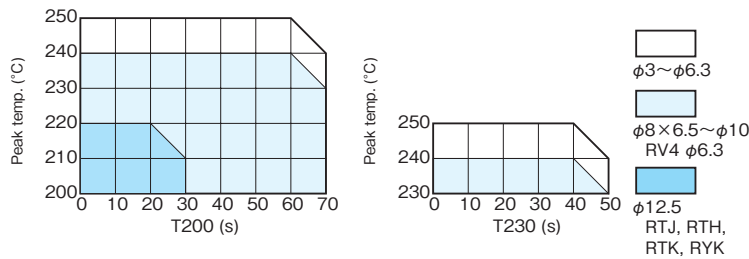
Iron tip temperature shall be 400°C±5°C within the duration of 3<sup>±1</sup> seconds.

(3) Reflow soldering conditions

Profile



Peak temp. matrix



1. Preheating shall be under 180°C within 120 seconds.
2. Peak temperature shall be within the peak temperature matrix.
3. For conditions exceeding the tolerances, consult with us.

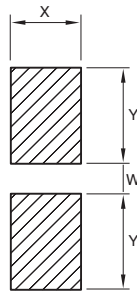
NOTE

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

### Recommended land pattern and size

(Vertical chip type)

● Standard type

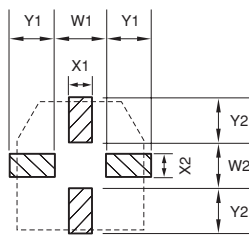


(Unit : mm)

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

\* For Vibration resistance use  
 φ8×6.5 Y=4.5 W=1.0  
 φ8×10, φ8×10.5 Y=4.0 W=2.5  
 φ10×10, φ10×10.5 Y=4.5 W=3.0

● For vibration resistance type

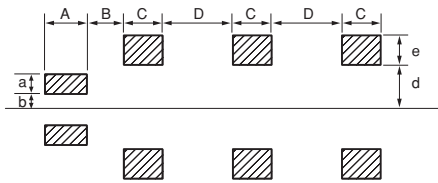


(Unit : mm)

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

(Horizontal chip type)

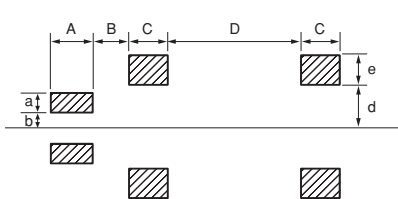
● □9.5×24.0 (8 pin type)



(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

● □9.5×19.0 (6 pin type)

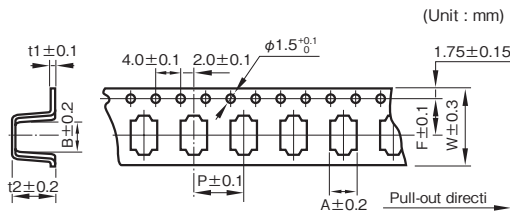


(Unit : mm)

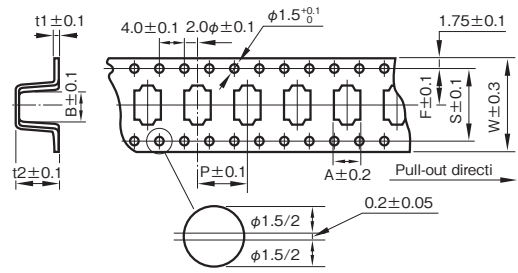
6 pin	
A	4.0
B	1.0
C	3.0
D	9.0
a	1.5
b	1.0
d	3.0
e	2.0
Thickness of Solder paste	0.15

## ■ Taping

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

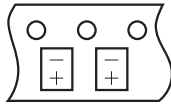


### ● Series RYK, RV (φ12.5), RVJ (φ12.5) RVK (φ12.5)

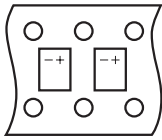


### ■ Taping polarity

(The all series except RVB and RYK)



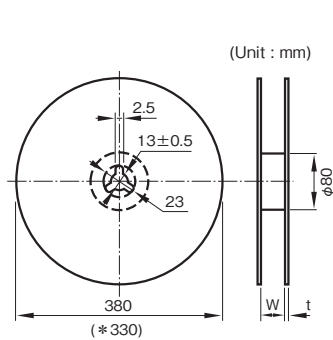
(Series RYK)



(Unit : mm)

Outside size φD×L	W	A	B	P	t2	F	t1	S
3×5.3	12	3.4	3.4	8.0	5.9	5.5	0.4	—
4×4.5	12	4.7	4.7	8.0	4.8	5.5	0.4	—
4×5.3	12	4.7	4.7	8.0	5.8	5.5	0.4	—
4×5.7, 5.8	12	4.7	4.7	8.0	6.2	5.5	0.4	—
5×4.5	12	5.7	5.7	12	4.8	5.5	0.4	—
5×5.3	12	5.7	5.7	12	5.8	5.5	0.4	—
5×5.7, 5.8	12	5.7	5.7	12	6.2	5.5	0.4	—
6.3×4.5	16	7.0	7.0	12	4.8	7.5	0.4	—
6.3×5.3	16	7.0	7.0	12	5.8	7.5	0.4	—
6.3×5.7, 5.8	16	7.0	7.0	12	6.2	7.5	0.4	—
6.3×7.7	16	7.0	7.0	12	8.3	7.5	0.4	—
8×6.5	16	8.7	8.7	12	6.8	7.5	0.4	—
8×6.7	24	8.7	8.7	12	7.2	11.5	0.4	—
8×10	24	8.7	8.7	16	11	11.5	0.4	—
8×10.5	24	8.7	8.7	16	11.5	11.5	0.4	—
10×7.7	24	10.7	10.7	16	8.2	11.5	0.4	—
10×10	24	10.7	10.7	16	11	11.5	0.4	—
10×10.5	24	10.7	10.7	16	11.5	11.5	0.4	—
* 12.5×13.5	32	13.4	13.4	24	14.5	14.2	0.5	28.4
* 12.5×17.5	32	13.4	13.4	24	18.5	14.2	0.5	28.4
* 9.5×19.0	44	9.9	22.9	16	9.5	20.2	0.4	40.4
* 9.5×24.0	44	9.9	27.9	16	9.5	20.2	0.4	40.4

### ■ Reel dimension



(Unit : mm)

Outside size φD×L	Reel dimension	
	W	t
3, 4	14	3
5	14	3
6.3	18	3
8×6.5	18	3
8×6.7	26	3
8, 10	26	3
* 12.5	34	3
* 9.5×19.0	45	3
* 9.5×24.0	45	3

### ■ Packing quantity (Reel)

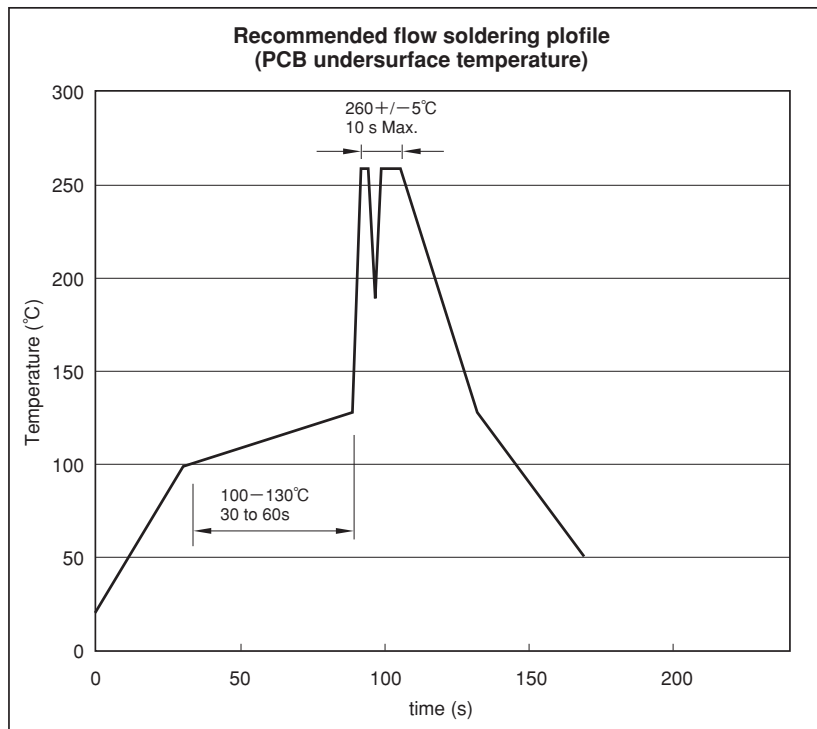
Outside size φD×L	Quantity (PCS.)
3, 4	2000
5, 6.3	1000
8×6.5	1000
8×6.7	1000
* 8, 10	500
* 12.5×13.5	200
* 12.5×17.5	150
* 9.5×19.0	400
* 9.5×24.0	400

#### NOTE

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

### ■ Recommended soldering condition (Lead free flow soldering)

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

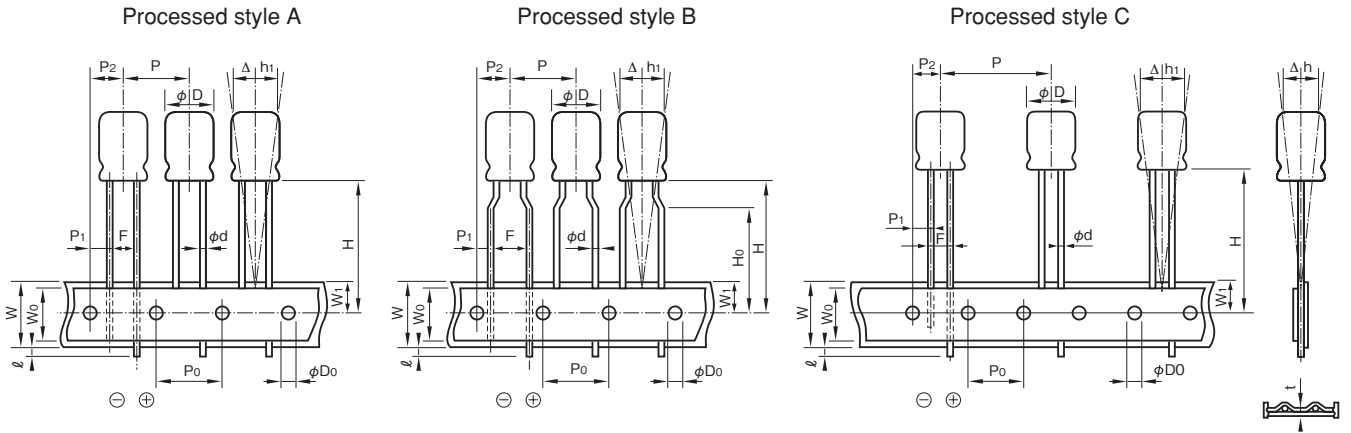


### Caution for Using aluminum Electrolytic Capacitors

- (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 cautions for using on page 30~33 and product specifications about other notes.

■ 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	
			φ3 to φ8(except φ8×7L)	φ4 to φ8
Lead forming symbol	—	—	T36	T58
Style	—	—	A or B	
Lead-wire diameter	φd	±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	H0	±0.5	—	16.0
Pitch of componet	P	±1.0	12.7	
Feed hole pitch	P0	±0.3	12.7	
Hole center to lead	P1	±0.5	5.1	3.85
Hole center to component	P2	±1.0	6.35	
Tape width	W	±0.5	18.0	
Hold down tape width	W0	Min.	6.0	
Feed hole position	W1	±0.5	9.0	
Max. lead protrusion	ℓ	Max.	1.0	
Feed hole diameter	φD0	±0.2	4.0	
Alignment of component to center	Δh	±1.0	0	
Alignment of component to center	Δh1	±1.0	0	
Total tape thickness	t	±0.2	0.7	

NOTE

Design, Specifications are subject to change without notice.  
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### Taping

- For automatic insertion (radial lead type)

Product Size Table

Unit: mm

Item	Symbol	Tolerance	11L to 25L						
			φ5, φ6.3		φ8	φ10	φ12.5	φ16, φ18	
Lead forming symbol	—	—	T36	T58	T2	T2	T2	T4	T50
Style	—	—	A or B		B		A		C
Lead-wire diameter	φd	±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 φ18 ±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	φD <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						

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

NOTE

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

**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	
	F1		5	5 to 11.5	A	
	F12	2.5	4	5,7	B	
	F12		5	5 to 11.5	B	
	F1		6.3	5 to 11.5	A	
	F4	3.5	4	5,7	B	
	F4		5	5,7	B	
	F4		6.3	5,7	B	
	F1		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		16	15 to 40	A	
	F	7.5	18	15 to 40	A	
F	18		15 to 40	A		
Snap-in	S1	5.0	4	5,7	B	
	S1		5	5 to 11.5	B	
	S1		6.3	5 to 11.5	B	
	S1		8	7 to 11.5	B	
	S1		10	9 to 30	A	
	S1		12.5	15 to 40	A	
	S1	7.5	16	15 to 40	A	
	S1		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

**NOTE**

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

## ■ 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 0.5%/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 use capacitors in an environment directly exposed to water, saltwater spray, oil spill or condensation.
- Do not use capacitors in an environment filled with toxic gas such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.
- Do not use 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  $\mu\text{A}$  to hundreds of  $\mu\text{A}$ ) 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

##### ①cleaning solutions:

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

##### ②Cleaning 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 halogenated fixatives and coatings.
- Before using a fixative or coating, remove flux residues and contaminants from between the PCB and the sealing section of capacitors.
- Dry the cleaning solution before using the adhesive or coating.
- Do not cover up all the sealing sections (terminal side) of capacitors with the adhesive or coating.
- Heat curing conditions of fixative and coating.

### ■ Other Cautions

#### 1. Do not directly touch the terminals of solid conductive polymer aluminum electrolytic capacitors.

Failure to do so can cause electric shock or burns. Before use, allow capacitors to discharge through a 1kΩ resistor (with a sufficient margin to the heat generation capacity) as needed.

#### 2. Do not short-circuit between the terminals of the solid conductive polymer aluminum electrolytic capacitors with electric conductor. Do not subject capacitors to conductive solutions such as acid and alkaline water solutions.

#### 3. Periodic inspection should be performed on the capacitors for the industrial equipment application.

Check the following checkpoints.

- Visual inspection to check for significant defects.
- Electrical performance: leakage current, rated capacitance, tangent of loss angle, ESR, and items specified in the catalog or delivery specification.

#### 4. Be careful of the following cases of emergency.

- In case of a short during use of capacitors in sets, producing gas, turn off the main power of the set or unplug the power cord from the outlet.
- In case of a short, producing gas, it may take a few seconds to a few minutes depending on the conditions. Therefore, ensure that the protective circuit of the power supply works during this time.
- If the gas gets in your eyes, rinse them immediately. Gargle if the gas is inhaled.
- Do not lick the electrolyte of capacitors. When the electrolyte gets on your skin, wash it off with soap immediately.

#### 5. Storage Conditions.

- Do not store at high temperature and high humidity. Store at a temperature of 5 to 35°C and a relative humidity of less than 75%, keeping free from direct sunlight.

- During delivery, capacitors are stored in airtight moistureproof bags to ensure satisfactory soldering. Once the bag is opened right before mounting, it is better to use up the capacitors. If some are unavoidably left over, return them to the moistureproof bag, and seal the opening hermetically.
- Solid conductive polymer aluminum electrolytic capacitors may have increased leakage current when unused or stored for a long time after mounted on equipment. This phenomenon often occurs at high ambient temperatures; however, leakage current will decrease through voltage treatment. If leakage current still increases after a lapse of more than one year at ambient temperature (shorter time at high temperatures), treat with voltage as needed. In design of equipment, consider the effect of increase in initial current, and install protective circuits as needed.

Please check that recommended voltage treatment conditions are provided for each series.

- 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.

#### 6. Please take the following actions when disposing of solid conductive polymer aluminum electrolytic capacitors.

- Entrust to specialists of industrial waste treatment for incineration.

#### 7. Others

- Before using capacitors, check the details of this delivery specification and catalog as well as the following.

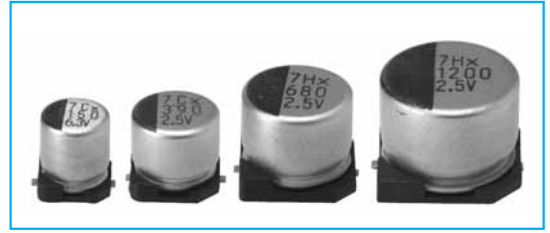
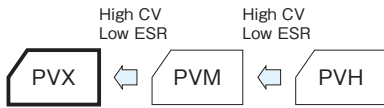
Technical Report of Japan Electronics and Information Technology Industries Association

EIAJ RCR-2367B

Guideline of notabilia for fixed aluminum electrolytic capacitors for use in electronic equipment

**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.



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 (100kHz)	
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 rate	0.5% 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

φD	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

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

Part numbering system (example : 4V151 M E60 □)

PVX	4	V	151	M	E60	□
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		
		Case φD×L (mm)	E.S.R. (mΩ)	Rated ripple current (mA <sub>rms</sub> )	Case φD×L (mm)	E.S.R. (mΩ)	Rated ripple current (mA <sub>rms</sub> )	Case φD×L (mm)	E.S.R. (mΩ)	Rated ripple current (mA <sub>rms</sub> )	Case φD×L (mm)	E.S.R. (mΩ)	Rated ripple current (mA <sub>rms</sub> )
100	—	—	—	—	—	—	5×5.7	15	3100	5×5.7	15	3100	
120	—	—	—	—	—	—	—	—	—	6.3×5.7	15	3200	
150	5×5.7	10	3800	5×5.7	10	3800	5×5.7	15	3100	—	—	—	
220	5×5.7	10	3800	5×5.7	10	3800	6.3×5.7	9	4000	8×6.7	10	3800	
270	5×5.7	10	3800	—	—	—	—	—	—	—	—	—	
330	—	—	—	6.3×5.7	9	4000	—	—	—	8×6.7	10	3800	
390	6.3×5.7	9	4000	—	—	—	8×6.7	8	4300	—	—	—	
470	—	—	—	8×6.7	8	4300	8×6.7	8	4300	10×7.7	10	4000	
560	8×6.7	8	4300	8×6.7	8	4300	—	—	—	—	—	—	
680	8×6.7	8	4300	10×7.7	8	4600	—	—	—	—	—	—	
820	—	—	—	—	—	—	10×7.7	8	4600	—	—	—	
1000	10×7.7	8	4600	10×7.7	8	4600	—	—	—	—	—	—	
1200	10×7.7	8	4600	—	—	—	—	—	—	—	—	—	

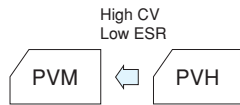
(Note) Rated ripple current : 105°C, 100kHz ; E.S.R. : 20°C, 100kHz

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.



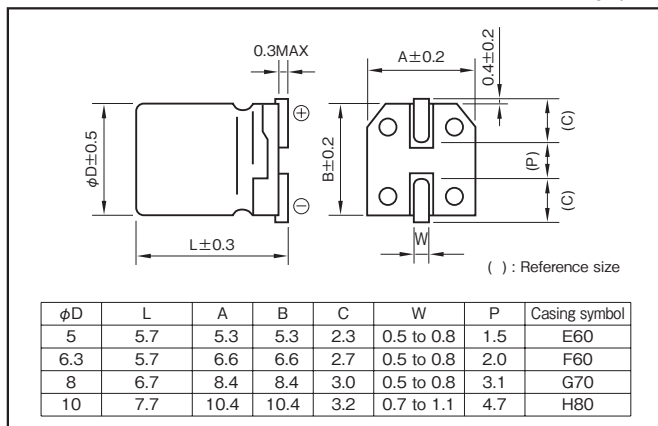
Specifications

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 (100kHz)	
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 rate	0.5% 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



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

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	

Standard Ratings

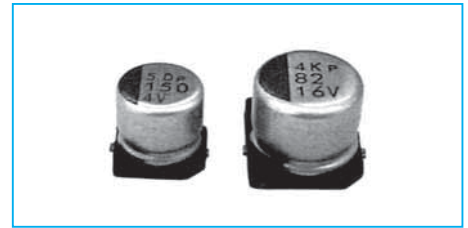
Rated voltage (V)	Item	2.5			4			6.3			10			16		
		Case	E.S.R.	Rated ripple current	Case	E.S.R.	Rated ripple current	Case	E.S.R.	Rated ripple current	Case	E.S.R.	Rated ripple current	Case	E.S.R.	Rated ripple current
Rated capacitance (μF)	φD×L (mm)	(mΩ)	(mA <sub>rms</sub> )	φD×L (mm)	(mΩ)	(mA <sub>rms</sub> )	φD×L (mm)	(mΩ)	(mA <sub>rms</sub> )	φD×L (mm)	(mΩ)	(mA <sub>rms</sub> )	φD×L (mm)	(mΩ)	(mA <sub>rms</sub> )	
33	—	—	—	—	—	—	—	—	—	—	—	—	5×5.7	35	2070	
39	—	—	—	—	—	—	—	—	—	—	—	—	5×5.7	35	2070	
47	—	—	—	—	—	—	—	—	—	—	5×5.7	28	2310	—	—	
56	—	—	—	—	—	—	—	—	—	—	5×5.7	28	2310	—	—	
68	—	—	—	—	—	—	—	—	—	—	5×5.7	28	2310	6.3×5.7	28	2340
100	—	—	—	5×5.7	22	2610	5×5.7	24	2500	—	—	—	8×6.7	24	3010	
120	—	—	—	—	—	—	5×5.7	24	2500	6.3×5.7	25	2530	8×6.7	24	3010	
150	—	—	—	5×5.7	22	2610	—	—	—	—	—	—	—	—	—	
180	5×5.7	21	2670	—	—	—	—	—	—	—	—	—	—	—	—	
220	—	—	—	—	—	—	6.3×5.7	15	3160	8×6.7	21	3220	10×7.7	22	3450	
270	—	—	—	6.3×5.7	15	3160	—	—	—	8×6.7	21	3220	—	—	—	
330	—	—	—	6.3×5.7	15	3160	8×6.7	14	3950	—	—	—	—	—	—	
390	6.3×5.7	15	3160	—	—	—	8×6.7	14	3950	—	—	—	—	—	—	
470	—	—	—	8×6.7	14	3950	—	—	—	10×7.7	19	3800	—	—	—	
560	8×6.7	13	3600	8×6.7	14	3950	—	—	—	—	—	—	—	—	—	
680	8×6.7	13	3600	—	—	—	—	—	—	—	—	—	—	—	—	
820	—	—	—	—	—	—	10×7.7	14	4300	—	—	—	—	—	—	
1000	—	—	—	10×7.7	14	4300	—	—	—	—	—	—	—	—	—	
1200	10×7.7	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.



PVH

Specifications

Item	Performance	
Category temperature range (°C)	-55 to +105	
Tolerance at rated capacitance (%)	±20 (20°C,120Hz)	
Leakage current (µA) *Note	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 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 (100kHz)
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 rate	0.5% 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

φD	L	A	B	C	W	P	Casing symbol
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

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

Part numbering system (example : 4V151 M 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.	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	Case	E.S.R.	Rated ripple current	Case	E.S.R.	Rated ripple current
Rated capacitance (μF)	φD×L (mm)	(mΩ)	(mAmps)	φD×L (mm)	(mΩ)	(mAmps)	φD×L (mm)	(mΩ)	(mAmps)	φD×L (mm)	(mΩ)	(mAmps)	φD×L (mm)	(mΩ)	(mAmps)	φD×L (mm)	(mΩ)	(mAmps)	φD×L (mm)	(mΩ)	(mAmps)	
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6.3×5.7	65	1500	
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6.3×5.7	50	1650	8×6.7	50	1800	
33	—	—	—	—	—	—	—	—	—	—	—	—	6.3×5.7	37	2050	—	—	—	—	—	—	
39	—	—	—	—	—	—	—	—	—	—	—	—	6.3×5.7	37	2050	8×6.7	45	2000	10×7.7	45	2100	
47	—	—	—	—	—	—	—	—	—	6.3×5.7	31	2250	—	—	—	8×6.7	45	2000	—	—	—	
56	—	—	—	—	—	—	—	—	—	6.3×5.7	31	2250	—	—	—	—	—	—	—	—	—	
68	—	—	—	—	—	—	6.3×5.7	27	2400	—	—	—	—	—	—	—	—	—	—	—	—	
82	—	—	—	—	—	—	6.3×5.7	27	2400	—	—	—	8×6.7	30	2700	10×7.7	40	2500	—	—	—	
100	—	—	—	6.3×5.7	26	2450	6.3×5.7	27	2400	—	—	—	—	—	—	—	—	—	—	—	—	
120	—	—	—	—	—	—	6.3×5.7	27	2400	8×6.7	27	2800	—	—	—	—	—	—	—	—	—	
150	—	—	—	6.3×5.7	26	2450	8×6.7	25	3020	8×6.7	27	2800	10×7.7	26	3430	—	—	—	—	—	—	
180	—	—	—	—	—	—	—	—	—	—	—	—	10×7.7	26	3430	—	—	—	—	—	—	
220	6.3×5.7	25	2500	8×6.7	25	3020	8×6.7	25	3020	—	—	—	—	—	—	—	—	—	—	—	—	
270	—	—	—	—	—	—	—	—	—	10×7.7	24	3770	—	—	—	—	—	—	—	—	—	
330	—	—	—	8×6.7	25	3020	10×7.7	20	4130	10×7.7	24	3770	—	—	—	—	—	—	—	—	—	
470	—	—	—	10×7.7	20	4130	10×7.7	20	4130	—	—	—	—	—	—	—	—	—	—	—	—	
560	8×6.7	23	3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
680	—	—	—	10×7.7	20	4130	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
1000	10×7.7	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, Miniature and Large Capacitance Aluminum Electrolytic Capacitors**

**NOTE**

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

## ■ 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 chloride 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 devise 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 11 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.

- (1) Appearance : Check if there is any open valve or leakage.
- (2) Electronic performance : Check the leakage current, the electrostatic capacitance, the tangent of loss angle and other items described in the catalog or the product specifications.

#### 4. Take the following measures in case of emergency.

- If you see gas coming out of the capacitor valve when the set is in operation, turn off the power switch of the unit or unplug the power cord from the outlet.
- Keep your face away from the capacitor pressure valve, since the high temperature gas at over 100°C bursts out when the valve works. If the gas gets into your eyes or your mouth, wash your eyes or your mouth. Do not ingest the capacitor electrolyte. If the electrolyte gets on your skin, wash it out with soap.

#### 5. Storing conditions.

- Avoid high temperature or high humidity when storing capacitors. Keep the storing temperature at 5°C to 35°C and the relative humidity not more than 75%.
- The leakage current of an aluminum electrolytic capacitor tends to increase when stored for a long time. This tendency becomes more prominent if the ambient temperature is high. The leakage current will be decreased by voltage application. If necessary, treatment by voltage application should

be made on the capacitors which have been stored for a long period (more than 2 years after production).

- Do not store capacitors at a place where there is a possibility that they may get water, salt or oil spill.
- Do not store capacitors at a place where the air contains dense hazardous gas (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.).
- Fumigation treatment with toxic gas covering the whole wooden container frames as moth proofing during shipment may leave residual toxic gas.
- Do not store capacitors at a place where it gets ultraviolet or radioactive rays.

#### 6. Disposing of capacitors.

- Punch a hole or crush the capacitors (to prevent explosion) before incineration at approved facility.
- If they are not to be incinerated, bring them to a professional industrial waste disposal company.

#### 7. 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-2367B "Guideline of notabilia for fixed aluminum electrolytic capacitors for use in electronic equipment")

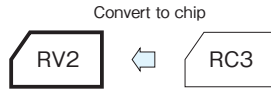
### ChipType Standard Capacitors (height:5.5mm)

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.



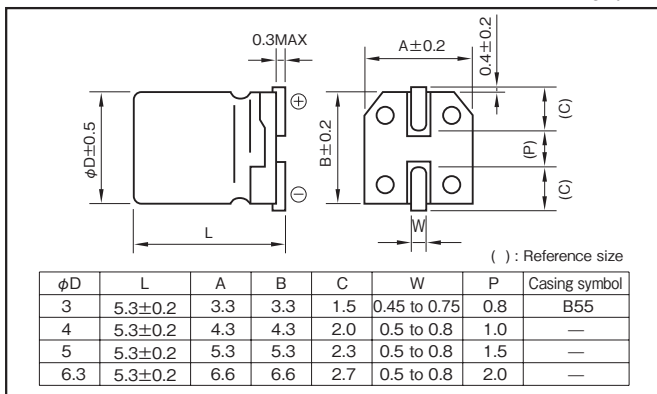
Marking color : Black print

### 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> <td></td> <td>4</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </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">φ3</td> <td colspan="2">φ4 to φ6.3</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> (20°C,120Hz)			4	6.3	10	16	25	35	50	tanδ (max.)	0.42	0.30	0.24	0.22	0.16	0.14	0.12		φ3		φ4 to φ6.3						0.42	0.28	0.24	0.20	0.14	0.12
	4	6.3	10	16	25	35	50																										
tanδ (max.)	0.42	0.30	0.24	0.22	0.16	0.14	0.12																										
	φ3		φ4 to φ6.3																														
	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.)	φ3	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																							
		φ4 to φ6.3	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																								
(120Hz)																																	
Endurance (85°C) (Applied ripple current)	Test time		2000 hours (φ3 : 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 : 1000hours ; 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



### 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			

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

### Standard Ratings

Rated capacitance (μF)	4				6.3				10				16				25				35				50			
	Case φD (mm)	Casing symbol	ESR Ω	Rated ripple current mArms	Case φD (mm)	Casing symbol	ESR Ω	Rated ripple current mArms	Case φD (mm)	Casing symbol	ESR Ω	Rated ripple current mArms	Case φD (mm)	Casing symbol	ESR Ω	Rated ripple current mArms	Case φD (mm)	Casing symbol	ESR Ω	Rated ripple current mArms	Case φD (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	3	B55	37	18	5	—	15	44	6.3	—	11	55				
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

### NOTE

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

Aluminum Electrolytic Capacitors

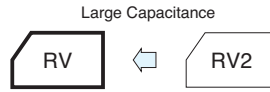
Chip Type Large Capacitance Capacitors

GREEN CAP

SMD

Anti-cleaning solvent

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



Marking color : Black print (φ8×6.5L)  
White print on a brown sleeve (φ8×10L · φ10×10L)

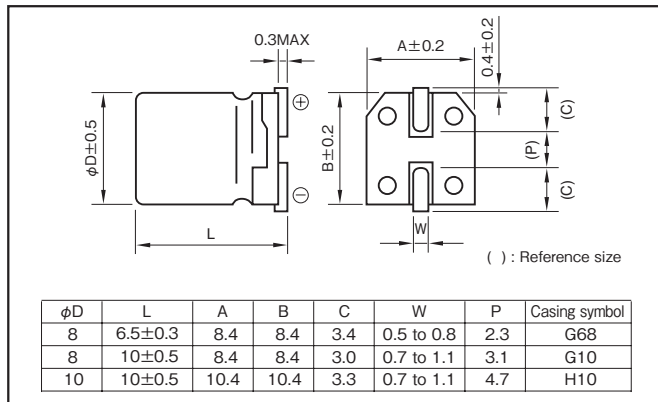
Specifications

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	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 (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 : 1000hours; 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 to 63	0.80	1	1.35	1.50
100	0.70	1	1.35	1.50

Part numbering system (example : 10V1000μF)



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

Standard Ratings

Rated capacitance (μF)	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			
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
68	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
100	—	—	—	8×6.5	G68	4.0	155	8×6.5	G68	3.3	155	8×6.5	G68	2.3	155	8×10	G10	2.0	252	10×10	H10	1.7	458	
220	8×6.5	G68	2.1	155	8×6.5	G68	1.8	155	8×10	G10	1.5	252	8×10	G10	1.1	252	10×10	H10	0.91	458	—	—	—	
330	8×6.5	G68	1.4	155	8×10	G10	1.2	252	8×10	G10	1.0	252	10×10	H10	0.70	458	—	—	—	—	—	—	—	
470	8×10	G10	0.99	252	10×10	H10	0.85	458	8×10	G10	0.71	252	10×10	H10	0.71	458	—	—	—	—	—	—	—	
1000	10×10	H10	0.46	458	10×10	H10	0.34	458	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

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

NOTE

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

## Chip Type, 85°C Use, Large Capacitance Capacitors

SMD

Anti-cleaning solvent

- Surface mount device.
- Supplied with taping.
- Guarantees 2000 hours at 85°C.



Large capacitance



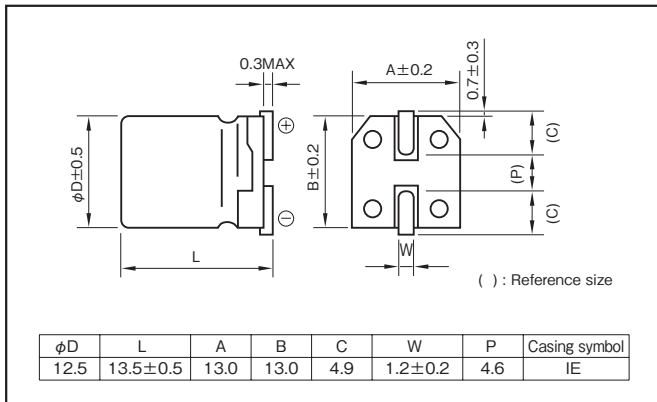
Marking color : White print on a brown sleeve

### 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 (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
Z-40°C/Z+20°C									
8 5 4 3 3 3 3 3 3 (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 : 1000hours ; 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



### Coefficient of Frequency for Rated Ripple Current

Rated capacitance (μF) \ Frequency(Hz)	120	1k	10k	100k
100 to 220	1	1.21	1.29	1.43
330 to 1000	1	1.16	1.23	1.25
1500 to 2200	1	1.06	1.11	1.11

### Part numbering system (example : 10V1500μF)

RV	—	10	V	152	M	IE	□	T	—	R5
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol			Taping symbol

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

### 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)	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms		
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
220	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
330	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
470	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
820	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
1000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
1500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
2200	12.5×13.5	IE	0.23	651	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		

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

### NOTE

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

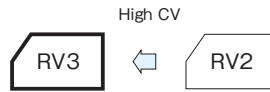
Chip Type 85°C Capacitors (height:5.5mm,8.0mm)

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

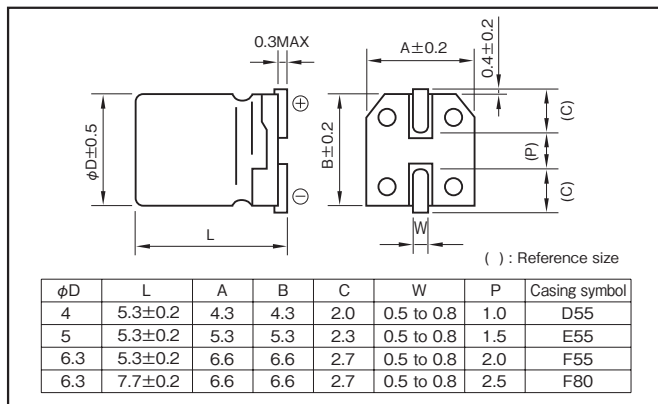
Specifications

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	Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2	2
		Z-40°C/Z+20°C	8	8	5	5	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)						

Chip Type Aluminum Electrolytic Capacitors

Outline Drawing

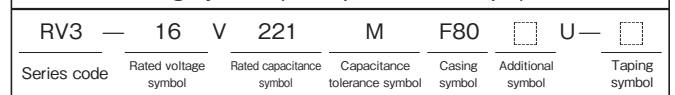
Unit: mm



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	0.70	1	1.35	1.50

Part numbering system (example : 16V220μF)



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

Standard Ratings

Rated capacitance (μF)	Item	6.3			10			16			25			35			50		
		Case	ESR Ω	Rated ripple current mArms	Case	ESR Ω	Rated ripple current mArms	Case	ESR Ω	Rated ripple current mArms	Case	ESR Ω	Rated ripple current mArms	Case	ESR Ω	Rated ripple current mArms	Case	ESR Ω	Rated ripple current mArms
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22	—	—	—	4×5.3	24	26	4×5.3	20	30	5×5.3	14	43	5×5.3	11	47	6.3×5.3	9.0	59	—
33	4×5.3	21	28	4×5.3	16	33	5×5.3	13	44	5×5.3	9.0	54	6.3×5.3	7.0	67	6.3×7.7	6.0	82	—
47	4×5.3	15	34	5×5.3	11	45	5×5.3	9.2	50	6.3×5.3	6.4	75	6.3×7.7	4.9	90	6.3×7.7	4.2	98	—
68	5×5.3	10	47	5×5.3	7.8	54	6.3×5.3	6.3	74	6.3×5.3	4.4	90	6.3×7.7	3.4	109	—	—	—	—
100	5×5.3	7.0	58	—	—	—	6.3×5.3	4.3	103	6.3×7.7	3.0	124	—	—	—	—	—	—	—
150	6.3×5.3	4.6	83	6.3×7.7	3.5	98	6.3×7.7	2.9	109	—	—	—	—	—	—	—	—	—	—
220	6.3×7.7	3.2	113	6.3×7.7	2.4	130	6.3×7.7	2.0	144	—	—	—	—	—	—	—	—	—	—
330	6.3×7.7	2.1	139	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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

NOTE

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

## 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



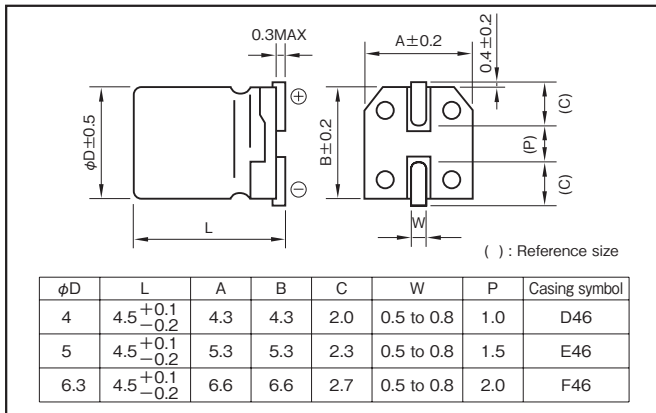
Marking color : Black print

### 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)	Z-25°C/Z+20°C	4	3	2	2	2
		Z-40°C/Z+20°C	8	8	4	4	3
	Impedance ratio (max.)	(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	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)						

### 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)



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

### 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	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (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

### NOTE

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

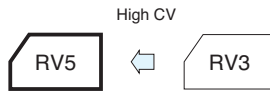
Chip Type Large Capacitance Capacitors

GREEN CAP

SMD

Anti-cleaning solvent

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



Marking color : Black print (φ3×5.3L—φ8×10L)  
White print on a brown sleeve (φ10×10L)

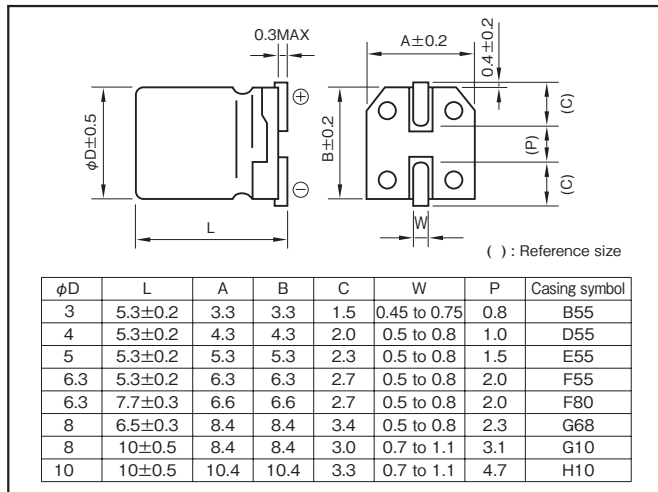
Specifications

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	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	
		Z-40°C/Z+20°C	10	8	6	4	3	3	3	3	(120Hz)
Endurance (85°C) (Applied ripple current)	Test time	2000 hours (φ3 : 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



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

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)	Item	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
		φD (mm)		mArms	φD (mm)		mArms	φD (mm)		mArms	φD (mm)		mArms	φD (mm)		mArms	φD (mm)		mArms	φD (mm)		mArms	φD (mm)		mArms
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
10	—	—	—	—	—	—	3×5.3	B55	18	3×5.3	B55	16	4×5.3	D55	24	5×5.3	E55	30	6.3×5.3	F55	32	—	—	—	
22	3×5.3	B55	21	3×5.3	B55	20	—	—	—	4×5.3	D55	24	5×5.3	E55	41	6.3×5.3	F55	47	6.3×7.7	F80	60	—	—	—	
																			8×6.5	G68	62				
33	—	—	—	—	—	—	4×5.3	D55	32	5×5.3	E55	47	—	—	—	8×6.5	G68	83	—	—	—	8×10	G10	94	
47	4×5.3	D55	34	4×5.3	D55	33	5×5.3	E55	52	—	—	—	6.3×5.3	F55	54	6.3×7.7	F80	85	8×10	G10	139	10×10	H10	189	
100	5×5.3	E55	55	5×5.3	E55	54	6.3×5.3	F55	70	6.3×7.7	F80	120	6.3×7.7	F80	120	8×10	G10	252	10×10	H10	226	—	—	—	
										8×6.5	G68	118													
150	—	—	—	6.3×5.3	F55	79	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
220	6.3×5.3	F55	88	6.3×7.7	F80	173	6.3×7.7	F80	162	—	—	—	8×10	G10	260	—	—	—	—	—	—	—	—	—	
				8×6.5	G68	175																			
330	6.3×7.7	F80	188	—	—	—	—	—	—	8×10	G10	300	10×10	H10	360	—	—	—	—	—	—	—	—	—	
	8×6.5	G68	190																						
470	—	—	—	8×10	G10	310	8×10	G10	307	10×10	H10	400	—	—	—	—	—	—	—	—	—	—	—	—	
680	—	—	—	—	—	—	10×10	H10	380	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
820	8×10	G10	320	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
1000	—	—	—	10×10	H10	454	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
1500	10×10	H10	489	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

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

Aluminum Electrolytic Capacitors  
Chip Type

**NOTE**

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

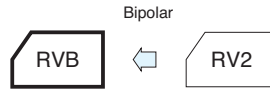
Chip Type Bipolar Capacitors (height:5.5mm)

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

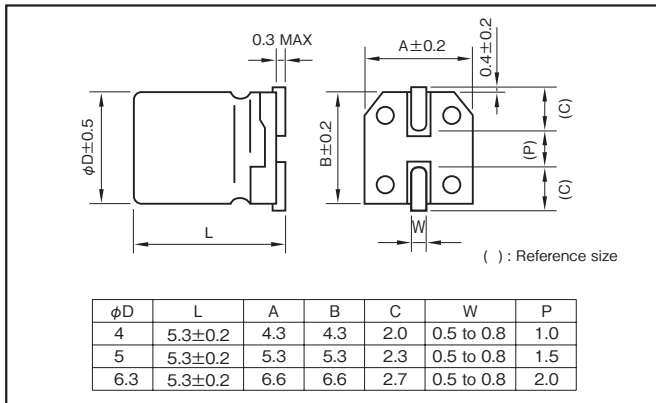
Specifications

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)
	tanδ (max.)
Characteristics at high and low temperature	Rated voltage (V)
	Impedance ratio (max.)
Endurance (85°C) (Applied ripple current)	Test time
	Leakage current
	Percentage of capacitance change
	Tangent of the loss angle
Shelf life (85°C)	Test time : 1000hours; 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	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)



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

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	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (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

NOTE

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

## 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.



High temperature



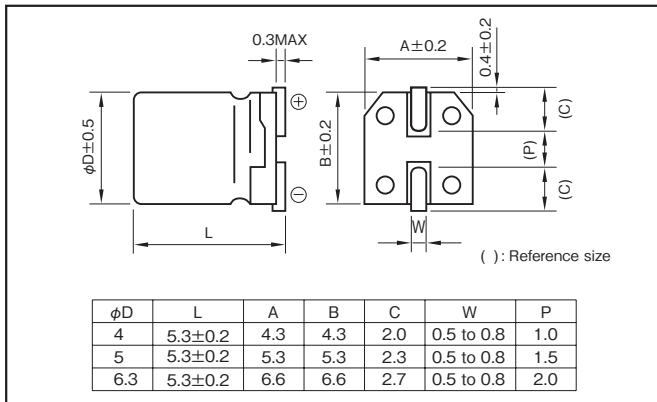
Marking color : Black print

### 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
	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, -18 1998 (IEC 60384-1 1992, -18 1993)						

### Outline Drawing

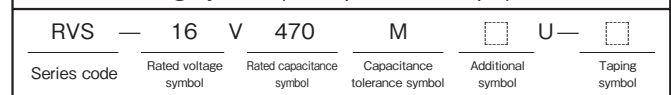
Unit : mm



### Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	50-60	120	1k	10k-100k
Rated voltage (V)				
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)



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

### Standard Ratings

Rated voltage (V)	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
Rated capacitance (μF)	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	1990	2	
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	905	3	
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	603	4	
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	424	5	
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	199	7	
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	91	10	
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	60	12	
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	42	17	
10	—	—	—	4	43	15	4	36	16	5	27	21	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

### NOTE

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

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

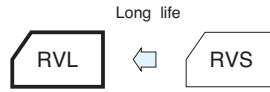
GREEN CAP

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.



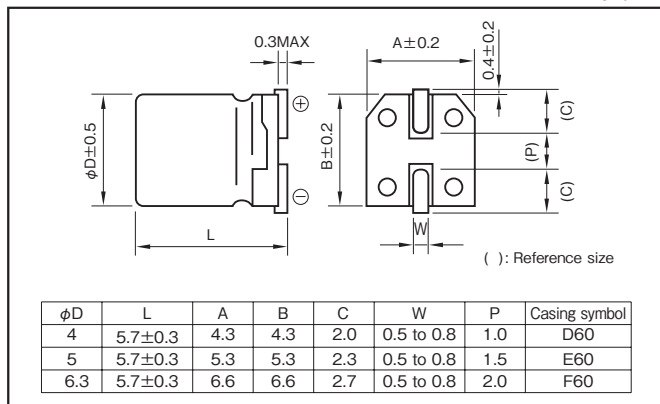
Marking color : Black print

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)	Z-25°C/Z+20°C	4	3	2	2	2
		Z-40°C/Z+20°C	8	5	4	3	3
	Impedance ratio (max.)	(120Hz)					
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 : 1000hours ; 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	0.8	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)



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

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
		φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (mm)	Ω	mArms	φD (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

NOTE

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

## 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



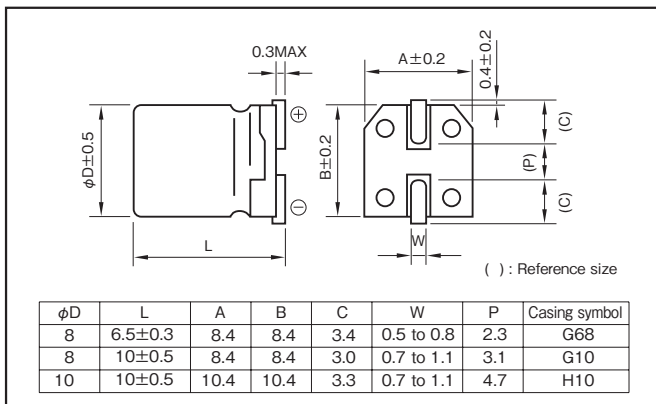
Marking color : Black print (φ8×6.5L)  
White print on a brown sleeve (φ8×10L . φ10×10L)

### 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	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)									

### Outline Drawing

Unit : mm



### Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	Rated voltage (V)			
	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	

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

### 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)	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
100	—	—	—	—	8×6.5	G68	4.3	110	8×6.5	G68	3.6	110	8×10	G10	2.7	178	8×6.5	G68	4.6	110	8×10	G10	2.2	324	8×10	G10	2.0	178	—	—	—	—
220	8×10	G10	2.3	178	8×10	G10	2.0	178	10×10	H10	1.7	324	10×10	H10	1.2	324	10×10	H10	0.98	324	—	—	—	—	—	—	—	—	—	—	—	—
330	8×10	G10	1.5	178	10×10	H10	1.3	324	10×10	H10	1.1	324	10×10	H10	0.80	324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
470	10×10	H10	1.0	324	10×10	H10	0.92	324	10×10	H10	0.78	324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1000	10×10	H10	0.50	324	10×10	H10	0.40	324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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

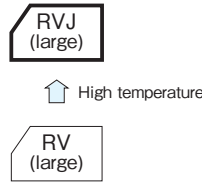
### NOTE

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

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

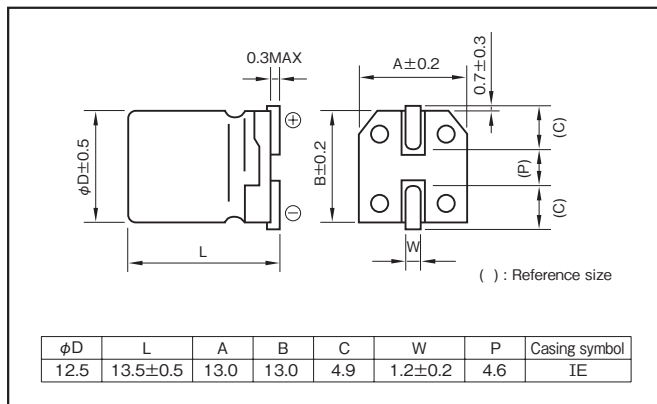
Specifications

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	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	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)										

Chip Type Aluminum Electrolytic Capacitors

Outline Drawing

Unit : mm



Coefficient of Frequency for Rated Ripple Current

Rated capacitance (μF)	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 : 10V1000μF)

RVJ	—	10	V	102	M	IE	□	T	—	R5
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol			Taping symbol

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

Standard Ratings

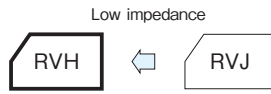
Rated capacitance (μF)	Rated voltage (V)															
	6.3		10		16		25		35		50		63		100	
	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
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.



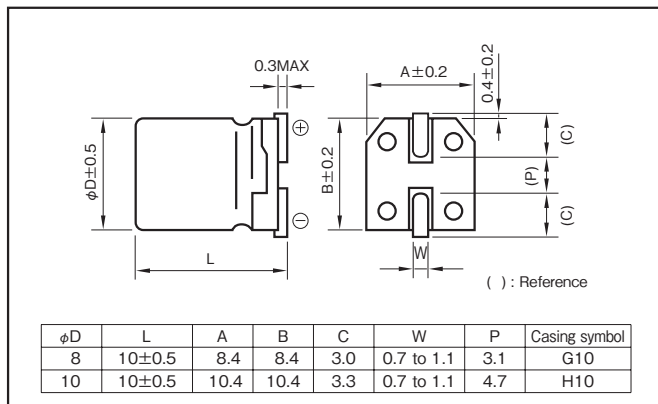
Marking color : White print on a brown sleeve

### 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	Impedance ratio (max.)	Rated voltage (V)					
		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



### 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

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

### Standard Ratings

Item	6.3				10				16				25				35			
	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA <sub>RMS</sub>	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA <sub>RMS</sub>	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA <sub>RMS</sub>	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA <sub>RMS</sub>	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA <sub>RMS</sub>
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	G10	0.45	369
100	—	—	—	—	—	—	—	—	—	—	—	—	8×10	G10	0.45	369	10×10	H10	0.25	553
220	—	—	—	—	8×10	G10	0.45	369	—	—	—	—	10×10	H10	0.25	553	—	—	—	—
330	8×10	G10	0.45	369	—	—	—	—	10×10	H10	0.25	553	—	—	—	—	—	—	—	—
470	—	—	—	—	10×10	H10	0.25	553	—	—	—	—	—	—	—	—	—	—	—	—

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

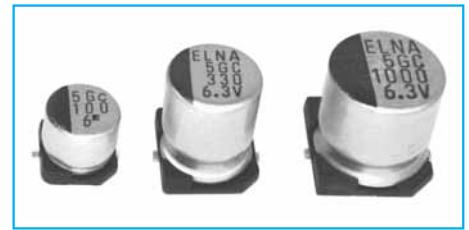
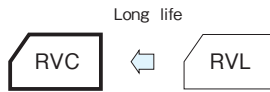
### NOTE

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

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	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	
	(120Hz)							
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

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

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)	6.3			10			16			25			35			50		
	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
	φD (mm)			φD (mm)			φD (mm)			φD (mm)			φD (mm)			φD (mm)		
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	1.0
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	2.6
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	3.2
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	5.0
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	10
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	16
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	17
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4×5.8	D61	17
10	—	—	—	—	—	—	4×5.8	D61	28	—	—	—	5×5.8	E61	28	6.3×5.8	F61	35
22	4×5.8	D61	26	—	—	—	5×5.8	E61	39	—	—	—	6.3×5.8	F61	55	6.3×7.7	F80	58
33	—	—	—	5×5.8	E61	43	—	—	—	6.3×5.8	F61	60	6.3×7.7	F80	57	8×10	G10	91
47	5×5.8	E61	46	—	—	—	6.3×5.8	F61	70	6.3×7.7	F80	65	—	—	—	8×10	G10	100
100	6.3×5.8	F61	71	—	—	—	6.3×7.7	F80	81	8×10	G10	130	—	—	—	10×10	H10	160
220	6.3×7.7	F80	101	8×10	G10	160	—	—	—	—	—	—	10×10	H10	220	—	—	—
330	8×10	G10	230	—	—	—	—	—	—	10×10	H10	238	—	—	—	—	—	—
470	—	—	—	—	—	—	10×10	H10	340	—	—	—	—	—	—	—	—	—
1000	10×10	H10	313	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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

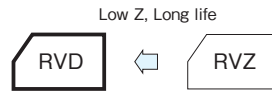
**NOTE**

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

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

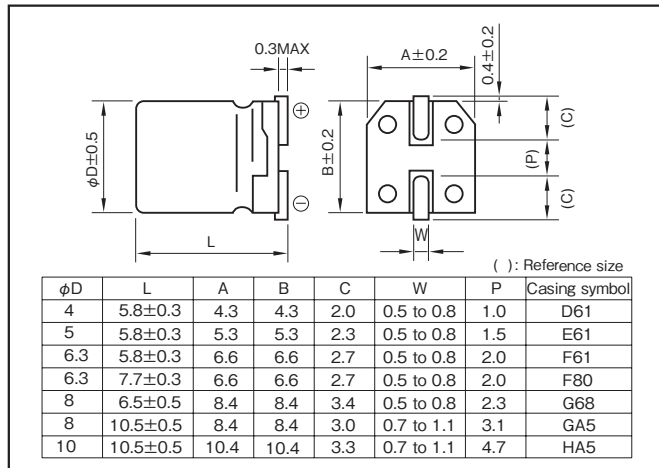
Specifications

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	Rated voltage (V)	6.3	10	16	25	35	50	
	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						
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



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	50	120	1k	10k·100k
Rated voltage (V)				
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 φD×L (mm)	Casing symbol	Impedance Ω	Rated ripple current mA	Case φD×L (mm)	Casing symbol	Impedance Ω	Rated ripple current mA	Case φD×L (mm)	Casing symbol	Impedance Ω	Rated ripple current mA	Case φD×L (mm)	Casing symbol	Impedance Ω	Rated ripple current mA	Case φD×L (mm)	Casing symbol	Impedance Ω	Rated ripple current mA	Case φD×L (mm)	Casing symbol	Impedance Ω	Rated ripple current mA							
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
10	—	—	—	—	—	—	—	—	4×5.8	D61	1.35	90	4×5.8	D61	1.35	90	4×5.8	D61	1.35	90	4×5.8	D61	1.35	90	5×5.8	E61	1.5	90				
22	4×5.8	D61	1.35	90	4×5.8	D61	1.35	90	4×5.8	D61	1.35	90	4×5.8	D61	1.35	90	5×5.8	E61	0.70	170	5×5.8	E61	0.70	170	5×5.8	E61	0.70	170	6.3×5.8	F61	0.86	170
33	—	—	—	—	4×5.8	D61	1.35	90	5×5.8	E61	0.70	170	—	—	—	—	5×5.8	E61	0.70	170	5×5.8	E61	0.70	170	6.3×5.8	F61	0.36	250	6.3×5.8	F61	0.36	250
47	4×5.8	D61	1.35	90	—	—	—	—	5×5.8	E61	0.70	170	5×5.8	E61	0.70	170	6.3×5.8	F61	0.36	250	6.3×5.8	F61	0.36	250	6.3×5.8	F61	0.36	250	6.3×7.7	F80	0.66	195
100	5×5.8	E61	0.70	170	—	—	—	—	6.3×5.8	F61	0.36	250	6.3×5.8	F61	0.36	250	6.3×7.7	F80	0.30	300	6.3×7.7	F80	0.30	300	6.3×7.7	F80	0.30	300	8×6.5	G68	0.63	200
220	6.3×5.8	F61	0.36	250	6.3×7.7	F80	0.30	300	6.3×7.7	F80	0.30	300	6.3×7.7	F80	0.30	300	8×6.5	G68	0.30	300	8×10.5	GA5	0.16	600	8×10.5	GA5	0.16	600	8×10.5	GA5	0.32	350
330	6.3×7.7	F80	0.30	300	8×6.5	G68	0.30	300	8×10.5	GA5	0.16	600	8×10.5	GA5	0.16	600	8×10.5	GA5	0.16	600	8×10.5	GA5	0.16	600	10×10.5	HA5	0.08	850	—	—	—	—
470	8×10.5	GA5	0.16	600	8×10.5	GA5	0.16	600	8×10.5	GA5	0.16	600	8×10.5	GA5	0.16	600	10×10.5	HA5	0.08	850	—	—	—	—	—	—	—	—	—	—	—	
680	—	—	—	—	8×10.5	GA5	0.16	600	10×10.5	HA5	0.08	850	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
1000	8×10.5	GA5	0.16	600	10×10.5	HA5	0.08	850	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
1500	10×10.5	HA5	0.08	850	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		

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

Aluminum Electrolytic Capacitors

Chip Type, 105°C Use, Low Impedance Capacitors

GREEN CAP

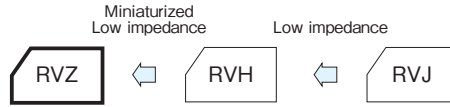
SMD

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 (φ4×5.3L-φ8×6.5L)  
White print on a brown sleeve (φ8×10L·φ10×10L)

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)	Z-25°C/Z+20°C	6.3	10	16	25	35
		Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2
		Z-55°C/Z+20°C	8	5	4	3	3
Endurance (105°C) (Applied ripple current)	Test time	2000 hours (8×6.5 or Smaller : 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 : 1000hours ; 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	5.3±0.2	4.3	4.3	2.0	0.5 to 0.8	1.0	D55
4	5.8±0.3	4.3	4.3	2.0	0.5 to 0.8	1.0	D61
5	5.3±0.2	5.3	5.3	2.3	0.5 to 0.8	1.5	E55
5	5.8±0.3	5.3	5.3	2.3	0.5 to 0.8	1.5	E61
6.3	5.3±0.2	6.6	6.6	2.7	0.5 to 0.8	2.0	F55
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±0.3	8.4	8.4	3.4	0.5 to 0.8	2.3	G68
8	10±0.5	8.4	8.4	3.0	0.7 to 1.1	3.1	G10
8	10.5±0.5	8.4	8.4	3.0	0.7 to 1.1	3.1	GA5
10	10±0.5	10.4	10.4	3.3	0.7 to 1.1	4.7	H10
10	10.5±0.5	10.4	10.4	3.3	0.7 to 1.1	4.7	HA5

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

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)	Rated capacitance (μF)	6.3				10				16				25				35				
		Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA Arms	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA Arms	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA Arms	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA Arms	Case φD (mm)	Casing symbol	Impedance Ω	Rated ripple current mA Arms	
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
10	—	—	—	—	4×5.3	D55	3.20	65	4×5.3	D55	3.20	65	4×5.3	D55	3.20	65	4×5.3	D55	3.20	65	4×5.3	D55
													5×5.3	E55	1.50	110	5×5.8	E61	0.76	150		
15	—	—	—	—	—	—	—	—	4×5.8	D61	1.80	80	5×5.8	E61	0.76	150	5×5.8	E61	0.76	150	5×5.8	E61
22	4×5.3	D55	3.20	65	4×5.8	D61	1.80	80	5×5.3	E55	1.50	110	5×5.8	E61	0.76	150	6.3×5.3	F55	0.85	170	6.3×5.3	F55
													6.3×5.3	F55	0.85	170	6.3×5.8	F61	0.44	230		
33	5×5.3	E55	1.50	110	5×5.3	E55	1.50	110	6.3×5.3	F55	0.85	170	6.3×5.3	F55	0.85	170	6.3×5.3	F55	0.85	170	6.3×5.3	F55
													6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230		
47	5×5.3	E55	1.50	110	6.3×5.3	F55	0.85	170	6.3×5.3	F55	0.85	170	6.3×5.3	F55	0.85	170	6.3×5.3	F55	0.85	170	6.3×5.3	F55
													6.3×7.7	F80	0.34	280	6.3×5.8	F61	0.44	230	8×6.5	G68
68	6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230	6.3×7.7	F80
													8×6.5	G68	0.34	280	8×6.5	G68	0.34	280		
100	6.3×5.3	F55	0.85	170	6.3×5.3	F55	0.85	170	6.3×5.3	F55	0.85	170	6.3×7.7	F80	0.34	280	6.3×7.7	F80	0.34	280	8×10	G10
									6.3×5.8	F61	0.44	230	8×6.5	G68	0.34	280	8×6.5	G68	0.34	280	8×10.5	GA5
150	6.3×5.8	F61	0.44	230	6.3×5.8	F61	0.44	230	6.3×7.7	F80	0.34	280	8×10	G10	0.20	450	8×10.5	GA5	0.17	450	8×10.5	GA5
									8×6.5	G68	0.34	280	8×10.5	GA5	0.17	450	10×10	H10	0.10	670		
220	6.3×5.8	F61	0.44	230	6.3×7.7	F80	0.34	280	6.3×7.7	F80	0.34	280	8×10.5	GA5	0.17	450	8×10.5	GA5	0.17	450	8×10.5	GA5
					8×6.5	G68	0.34	280	8×10	G10	0.20	450	10×10	H10	0.10	670	10×10	H10	0.10	670		
330	6.3×7.7	F80	0.34	280	8×10.5	GA5	0.17	450	8×10.5	GA5	0.17	450	8×10.5	GA5	0.17	450	8×10.5	GA5	0.17	450	10×10.5	HA5
													8×6.5	G68	0.34	200	10×10	H10	0.10	670	10×10	H10
470	8×10.5	GA5	0.17	450	8×10.5	GA5	0.17	450	8×10.5	GA5	0.17	450	10×10.5	HA5	0.09	670	—	—	—	—	—	—
													10×10	H10	0.10	670	10×10	H10	0.10	670		
680	8×10.5	GA5	0.17	450	10×10.5	HA5	0.09	670	10×10.5	HA5	0.09	670	—	—	—	—	—	—	—	—	—	
1000	8×10.5	GA5	0.17	450	10×10.5	HA5	0.09	670	—	—	—	—	—	—	—	—	—	—	—	—	—	
									10×10	H10	0.10	670	—	—	—	—	—	—	—	—	—	—
1500	10×10.5	HA5	0.09	670	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

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

Chip Type Aluminum Electrolytic Capacitors

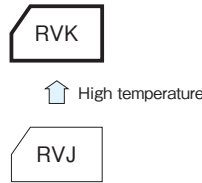
**NOTE**

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

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. (φ8 : 1000 hours)
- Guarantees 5000 hours at 105°C. (φ8 : 4000 hours)



Marking color : Gold print on a brown sleeve

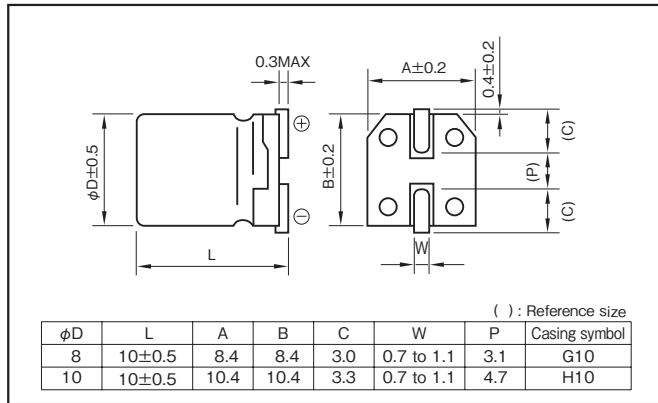
Specifications

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
Endurance (Applied ripple current)	Test temp.	125°C			105°C			
	Test time	φ10 : 1250h, φ8 : 1000h			φ10 : 5000h, φ8 : 4000h			
	Percentage of capacitance change	Within ±30% of initial value						
	Tangent of the loss angle	300% or less of the initial specified value						
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)							

Chip Type Aluminum Electrolytic Capacitors

Outline Drawing

Unit : mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	120	1k	10k	100k
Rated voltage (V)	120	1k	10k	100k
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			
	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
Rated capacitance (μF)	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	32	0.80	38	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10×10	32	0.65	45	—	—	—	—
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	14	0.80	38	8×10	14	1.00	33
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10×10	14	0.65	48	10×10	14	0.67	48
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	10	0.80	40	—	—	—	—
220	8×10	2.1	0.68	60	10×10	2.0	0.55	107	—	—	—	—	—	—	—	—	10×10	10	0.60	58	—	—	—	—
330	10×10	1.4	0.55	111	—	—	—	—	—	—	—	—	—	—	—	—	8×10	7.1	0.68	55	—	—	—	—
																	10×10	7.1	0.58	70	—	—	—	—

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

NOTE

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

## 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.



High temperature



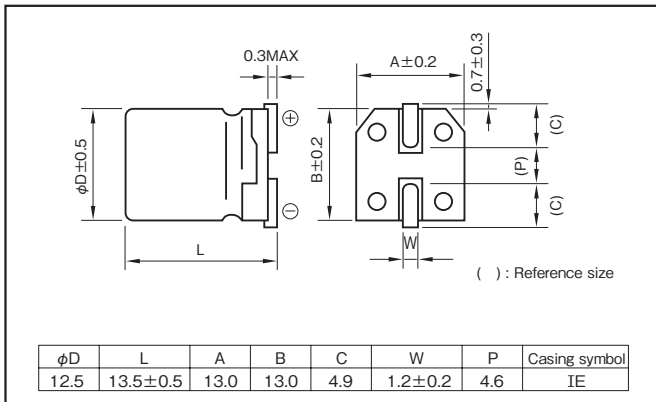
Marking color : White print on a brown sleeve

### 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)						

### Outline Drawing

Unit : mm



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

### 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)

RVK	—	10	V	471	M	IE	□	T	—	R5
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			
	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)	φD (mm)	Symbol	Ω	mArms	φD (mm)	Symbol	Ω	mArms	φD (mm)	Symbol	Ω	mArms	φD (mm)	Symbol	Ω	mArms	φD (mm)	Symbol	Ω	mArms	φD (mm)	Symbol	Ω	mArms
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12.5×13.5	IE	0.136	509	12.5×13.5	IE	0.176	447
220	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12.5×13.5	IE	0.105	579	—	—	—	—
330	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12.5×13.5	IE	0.105	579	—	—	—	—
470	12.5×13.5	IE	0.105	579	12.5×13.5	IE	0.105	579	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

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

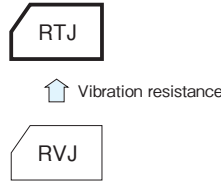
### NOTE

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

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	
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
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

Unit : mm

ϕD	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
Rated voltage (V)				
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)

RTJ	—	25	V	221	M	H11	□	U	—	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol			Taping symbol

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

Standard Ratings

Rated capacitance (µF)	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				
	ϕD (mm)	Ω	mArms	ϕD (mm)	Ω	mArms	ϕD (mm)	Ω	mArms	ϕD (mm)	Ω	mArms	ϕD (mm)	Ω	mArms	ϕD (mm)	Ω	mArms	ϕD (mm)	Ω	mArms	ϕD (mm)	Ω	mArms				
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	G10	16.6	67
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	G10	8.3	99
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
100	—	—	—	—	—	—	8×10	G10	3.6	178	8×10	G10	2.7	178	8×10	G10	4.6	178	8×10	G10	6.0	178	10×10.5	H11	5.5	160	—	—
220	8×10	G10	2.3	178	8×10	G10	2.0	178	10×10.5	H11	1.7	324	10×10.5	H11	1.2	324	10×10.5	H11	1.2	324	10×10.5	H11	2.0	324	—	—	—	—
330	8×10	G10	1.5	178	10×10.5	H11	1.3	324	10×10.5	H11	1.1	324	10×10.5	H11	0.80	324	—	—	—	—	—	—	—	—	—	—	—	—
470	10×10.5	H11	1.0	324	10×10.5	H11	0.92	324	10×10.5	H11	0.78	324	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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

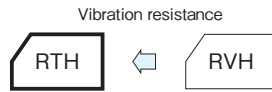
NOTE

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

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

SMD	Vibration Resistance	Low Impedance	105°C 2000hours	Anti-cleaning solvent
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- Compatible with surface mounting.
- For Vibration resistance.
- Supplied with carrier taping.
- Guarantees 2000 hours at 105°C.



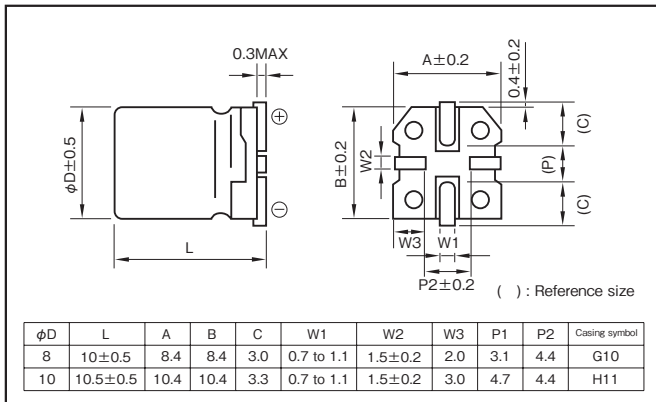
Marking color : White print on a brown sleeve

### 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)	Z-25°C/Z+20°C	4	3	2	2
		Z-40°C/Z+20°C	8	5	4	3
	Impedance ratio (max.)	(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 ; 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)					

### Outline Drawing

Unit : mm



### 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

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

### 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)	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms	φD (mm)		Ω	mArms
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	G10	0.45	369
100	—	—	—	—	—	—	—	—	—	—	—	—	8×10	G10	0.45	369	10×10.5	H11	0.25	553
220	—	—	—	—	8×10	G10	0.45	369	—	—	—	—	10×10.5	H11	0.25	553	—	—	—	—
330	8×10	G10	0.45	369	—	—	—	—	10×10.5	H11	0.25	553	—	—	—	—	—	—	—	—
470	—	—	—	—	10×10.5	H11	0.25	553	—	—	—	—	—	—	—	—	—	—	—	—

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

### NOTE

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

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. (φ8 : 1000 hours)
- Guarantees 5000 hours at 105°C. (φ8 : 4000 hours)



Vibration resistance



Marking color : Gold print on a brown sleeve

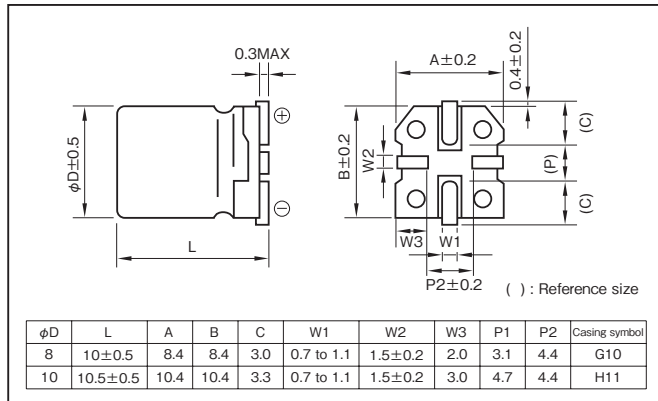
Specifications

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	(20°C,120Hz)							
	Rated voltage (V)	10	16	25	35	50	63	
	Impedance ratio (max.)	Z-25°C/Z+20°C	3	3	3	3	3	3
Endurance (Applied ripple current)	(120Hz)							
	Test temp.	125°C			105°C			
	Test time	φ10 : 1250h, φ8 : 1000h			φ10 : 5000h, φ8 : 4000h			
	Percentage of capacitance change	Within ±30% of initial value						
	Tangent of the loss angle	300% or less of the initial specified value						
Shelf life	The initial specified value or less							
	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						
Applicable standards	The initial specified value or less							
	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

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

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

Standard Ratings

Rated capacitance (μF)	10				16				25				35				50				63			
	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
Item	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms	φD (mm)	Ω	Ω	mArms
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	32	0.80	38	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10×10.5	32	0.65	45	—	—	—	—
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	14	0.80	38	8×10	14	1.00	33
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10×10.5	14	0.65	48	10×10.5	14	0.67	48
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8×10	10	0.80	40	—	—	—	—
220	8×10	2.1	0.68	60	10×10.5	2.0	0.55	107	—	—	—	—	—	—	—	—	10×10.5	10	0.60	58	—	—	—	—
330	10×10.5	1.4	0.55	111	—	—	—	—	—	—	—	—	—	—	—	—	8×10	7.1	0.68	55	—	—	—	—
																	10×10.5	7.1	0.58	70	—	—	—	—

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

NOTE

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

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

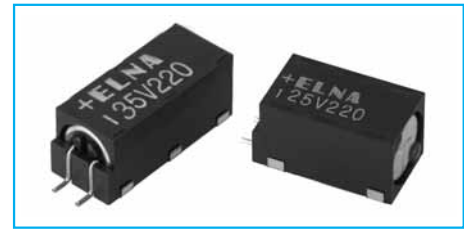
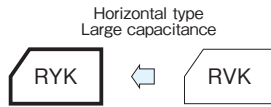
SMD

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.



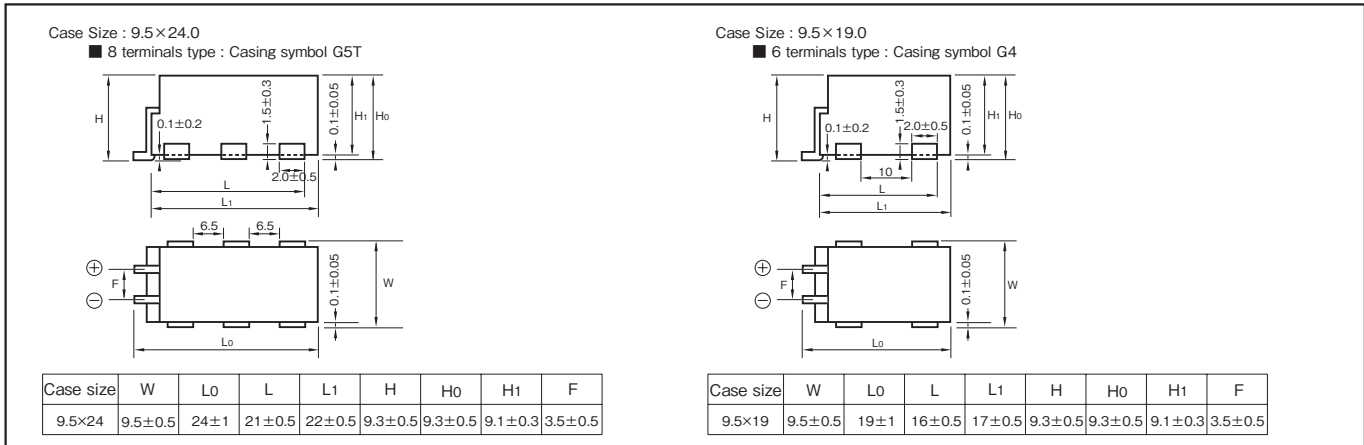
Marking color : White print on a black case

### 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



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

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

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

### Standard Ratings

Rated capacitance (µF)	Item	6.3			10			16			25			35			50			63		
		Case W×L (mm)	Impedance Ω	Rated ripple current mArms	Case W×L (mm)	Impedance Ω	Rated ripple current mArms	Case W×L (mm)	Impedance Ω	Rated ripple current mArms	Case W×L (mm)	Impedance Ω	Rated ripple current mArms	Case W×L (mm)	Impedance Ω	Rated ripple current mArms	Case W×L (mm)	Impedance Ω	Rated ripple current mArms			
56	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
82	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
220	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
270	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
470	—	—	—	9.5×19.0	0.40	232	9.5×24.0	0.30	302	—	—	—	—	—	—	—	—	—	—	—		
560	9.5×19.0	0.40	232	9.5×24.0	0.30	302	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
820	9.5×24.0	0.30	302	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		

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

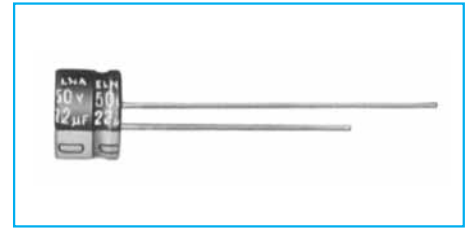
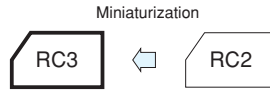
### NOTE

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

5mm L Standard Capacitors

GREEN CAP

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



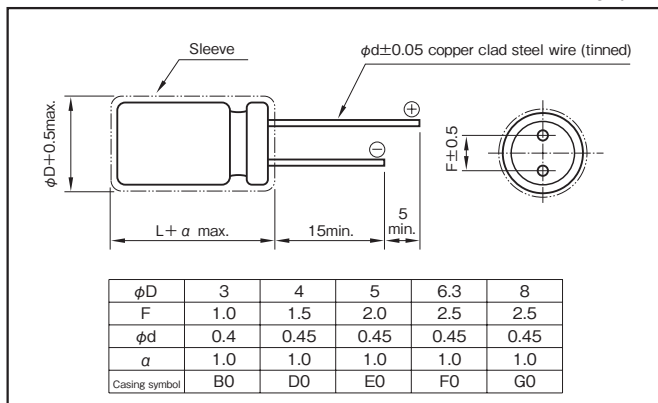
Marking color : White print on a blue sleeve ( $\phi 3$ : black sleeve)

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)								

Outline Drawing

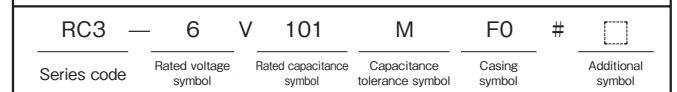
Unit : mm



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	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 $\phi D \times L$ (mm)	Rated ripple current mArms	Case $\phi D \times L$ (mm)	Rated ripple current mArms	Case $\phi D \times L$ (mm)	Rated ripple current mArms	Case $\phi D \times L$ (mm)	Rated ripple current mArms	Case $\phi D \times L$ (mm)	Rated ripple current mArms	Case $\phi D \times L$ (mm)	Rated ripple current mArms	Case $\phi D \times L$ (mm)	Rated ripple current mArms
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—
220	—	—	—	—	—	—	—	—	—	—	—	—	—	—
330	—	—	—	—	—	—	—	—	—	—	—	—	—	—
470	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Note) Rated ripple current : 85°C, 120Hz ; The types of capacitor marked with a black circle are manufactured in the  $\phi 3 \times 5$  size also ; the figures in the parentheses are applicable to capacitors with  $\phi 3$ .

NOTE

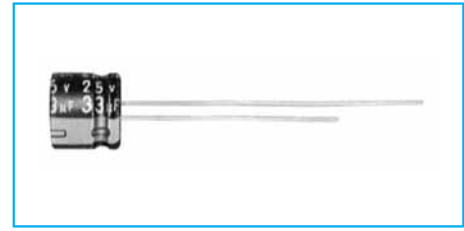
Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

**5mm 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 5mm.
- Guarantees 1000 hours at 105°C.



High temperature

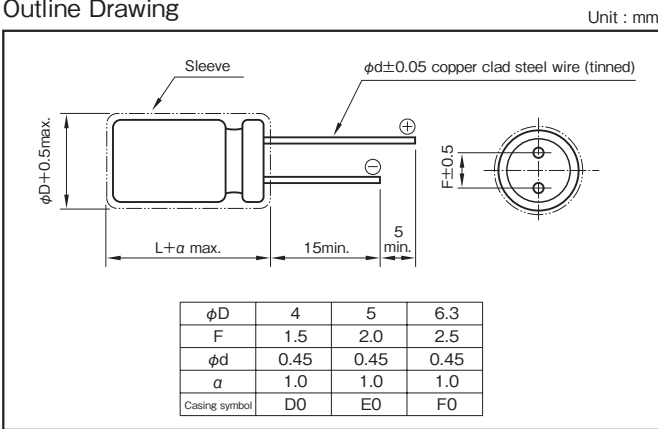


Marking color : White print on a black sleeve

## 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 (20°C, 120Hz)
Characteristics at high and low temperature	Impedance ratio (max.)	Rated voltage (V)
		Z-25°C/Z+20°C
		Z-40°C/Z+20°C
		6.3    10    16    25    35    50
		3    3    2    2    2    2
		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)	

## 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)	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)	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms
0.1	—	—	—	—	—	—	—	—	—	—	4×5	3
0.22	—	—	—	—	—	—	—	—	—	—	4×5	5
0.33	—	—	—	—	—	—	—	—	—	—	4×5	6
0.47	—	—	—	—	—	—	—	—	—	—	4×5	8
1	—	—	—	—	—	—	—	—	—	—	4×5	11
2.2	—	—	—	—	—	—	—	—	—	—	4×5	17
3.3	—	—	—	—	—	—	—	—	4×5	17	4×5	20
4.7	—	—	—	—	4×5	15	4×5	18	4×5	20	5×5	27
10	—	—	4×5	20	4×5	23	5×5	31	5×5	34	6.3×5	45
22	4×5	26	5×5	34	5×5	38	6.3×5	53	6.3×5	57	—	—
33	5×5	33	5×5	43	6.3×5	56	6.3×5	66	—	—	—	—
47	5×5	45	6.3×5	58	6.3×5	65	—	—	—	—	—	—
100	6.3×5	78	—	—	—	—	—	—	—	—	—	—

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

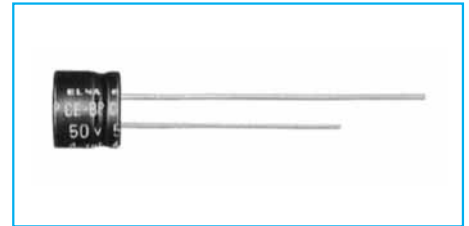
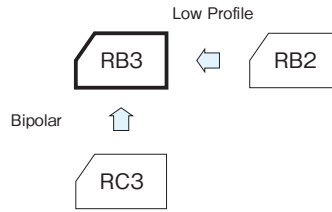
## NOTE

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

5mm L Bipolar Capacitors

GREEN CAP

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

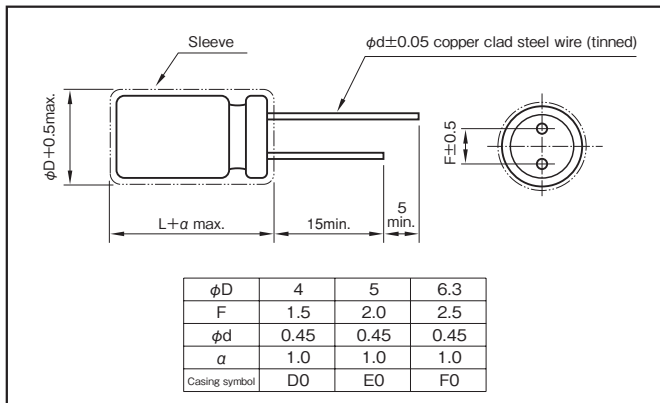


Marking color : White print on a blue sleeve

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.)
Endurance (85°C) (Applied ripple current)	Test time
	Leakage current
Applicable standards	Percentage of capacitance change
	Tangent of the loss angle

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 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
0.1	—	—	—	—	—	—	—	—	—	—	4×5	2
0.22	—	—	—	—	—	—	—	—	—	—	4×5	3
0.33	—	—	—	—	—	—	—	—	—	—	4×5	4
0.47	—	—	—	—	—	—	—	—	—	—	4×5	5
1	—	—	—	—	—	—	—	—	—	—	4×5	7
2.2	—	—	—	—	—	—	—	—	4×5	11	5×5	14
3.3	—	—	—	—	—	—	4×5	13	5×5	17	6.3×5	20
4.7	—	—	—	—	4×5	14	5×5	21	6.3×5	24	6.3×5	24
10	—	—	4×5	18	5×5	26	6.3×5	35	6.3×5	35	—	—
22	5×5	31	6.3×5	40	6.3×5	45	—	—	—	—	—	—
33	6.3×5	45	6.3×5	49	—	—	—	—	—	—	—	—
47	6.3×5	54	6.3×5	59	—	—	—	—	—	—	—	—

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

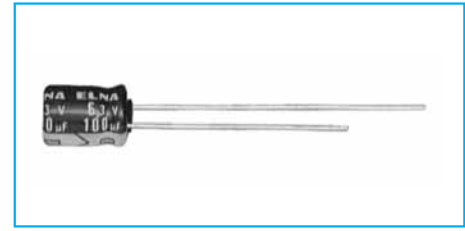
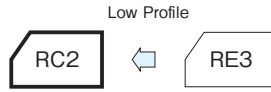
NOTE

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

## 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.

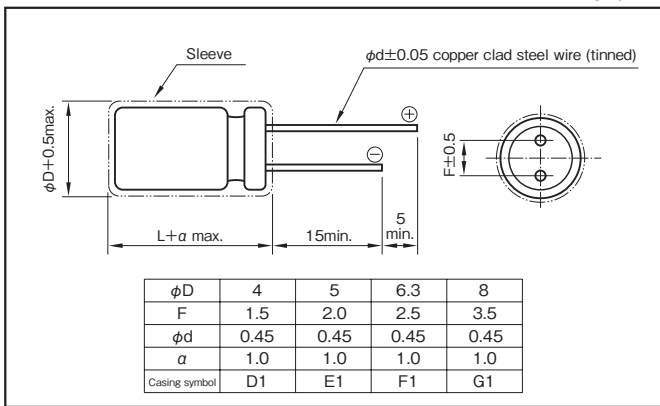


Marking color : White print on a blue sleeve

### 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
		Z-40°C/Z+20°C	16	10	8	6	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



### 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 capacitance (µF)	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
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33	4×7	35	4×7	40	4×7	45	5×7	55	6.3×7	70	6.3×7	75	8×7	100	—	—	—	—
47	4×7	40	4×7	50	5×7	60	5×7	70	6.3×7	85	8×7	110	—	—	—	—	—	—
100	5×7	70	5×7	80	6.3×7	105	6.3×7	120	8×7	145	—	—	—	—	—	—	—	—
220	6.3×7	120	6.3×7	140	8×7	185	8×7	205	—	—	—	—	—	—	—	—	—	—
330	8×7	170	8×7	205	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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

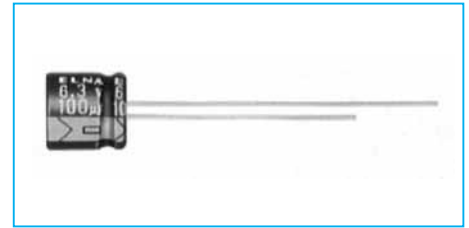
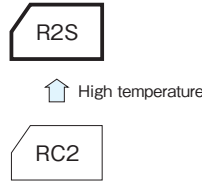
### NOTE

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

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.



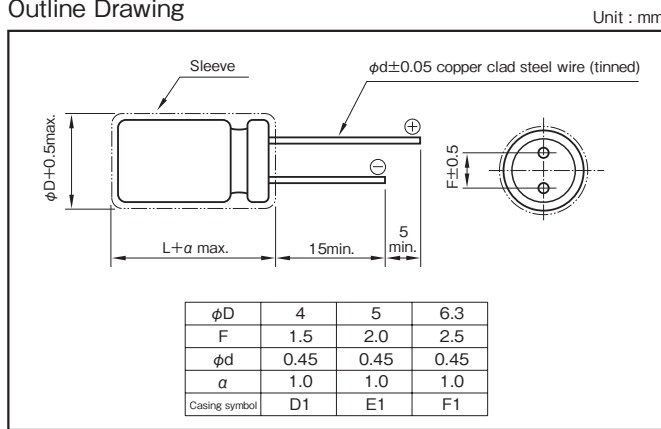
Marking color : White print on a black sleeve

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)
	tanδ (max.)
Characteristics at high and low temperature	Rated voltage (V)
	Impedance ratio (max.)
Endurance (105°C) (Applied ripple current)	Test time
	Leakage current
	Percentage of capacitance change
	Tangent of the loss angle
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)

Miniature 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	0.68	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)	$\phi D \times L$ (mm)	mArms	$\phi D \times L$ (mm)	mArms	$\phi D \times L$ (mm)	mArms	$\phi D \times L$ (mm)	mArms	$\phi D \times L$ (mm)	mArms	$\phi D \times L$ (mm)	mArms
0.1	—	—	—	—	—	—	—	—	—	—	4×7	6
0.22	—	—	—	—	—	—	—	—	—	—	4×7	8
0.33	—	—	—	—	—	—	—	—	—	—	4×7	10
0.47	—	—	—	—	—	—	—	—	—	—	4×7	12
1	—	—	—	—	—	—	—	—	—	—	4×7	16
2.2	—	—	—	—	—	—	—	—	—	—	4×7	25
3.3	—	—	—	—	—	—	4×7	21	4×7	23	4×7	28
4.7	—	—	—	—	—	—	4×7	25	4×7	25	5×7	48
10	—	—	—	—	4×7	39	5×7	47	5×7	48	6.3×7	75
22	4×7	42	4×7	49	5×7	54	6.3×7	87	6.3×7	90	—	—
33	5×7	53	5×7	60	6.3×7	83	6.3×7	90	—	—	—	—
47	5×7	64	6.3×7	95	6.3×7	95	—	—	—	—	—	—
100	6.3×7	96	—	—	—	—	—	—	—	—	—	—

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

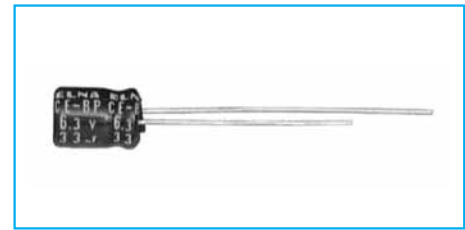
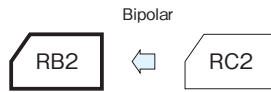
NOTE

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

## 7mm L Bipolar Capacitors

GREEN CAP Anti-cleaning solvent

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

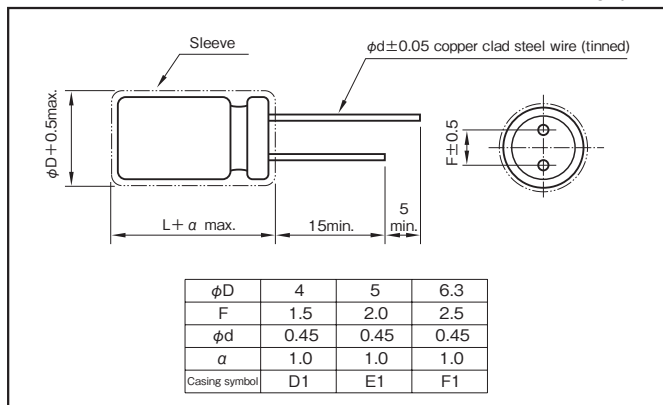


Marking color : White print on a blue sleeve

### 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) \ 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
Rated capacitance ( $\mu F$ )	$\phi D \times L$ (mm)	mArms	$\phi D \times L$ (mm)	mArms	$\phi D \times L$ (mm)	mArms	$\phi D \times L$ (mm)	mArms	$\phi D \times L$ (mm)	mArms	$\phi D \times L$ (mm)	mArms
0.1	—	—	—	—	—	—	—	—	—	—	4×7	3
0.22	—	—	—	—	—	—	—	—	—	—	4×7	4
0.33	—	—	—	—	—	—	—	—	—	—	4×7	5
0.47	—	—	—	—	—	—	—	—	—	—	4×7	6
1	—	—	—	—	—	—	—	—	—	—	4×7	9
2.2	—	—	—	—	—	—	—	—	4×7	14	5×7	16
3.3	—	—	—	—	—	—	4×7	17	5×7	19	5×7	19
4.7	—	—	—	—	4×7	17	5×7	23	5×7	23	6.3×7	27
10	—	—	4×7	23	5×7	29	6.3×7	39	6.3×7	39	—	—
22	5×7	35	5×7	39	6.3×7	50	6.3×7	58	—	—	—	—
33	5×7	43	6.3×7	55	6.3×7	61	6.3×7	71	—	—	—	—
47	6.3×7	60	6.3×7	66	6.3×7	73	—	—	—	—	—	—

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

Standard Capacitors

GREEN CAP

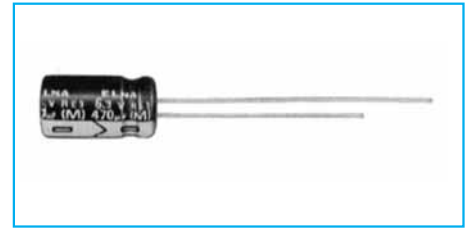
Anti-cleaning solvent 250V Max.

- Guarantees 2000 hours at 85°C.

RJ4

High temperature

RE3



Marking color : White print on a blue sleeve

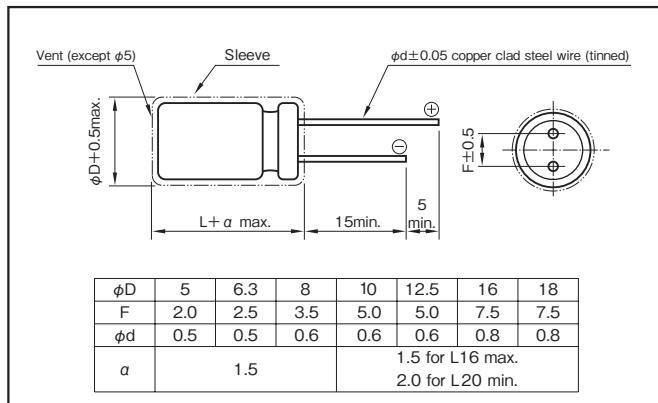
Specifications

Item	Performance
Category temperature range (°C)	-40 to +85
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)
Leakage current (μA)	Rated voltage (V) 6.3 to 100
	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)
Tangent of loss angle (tanδ)	Rated voltage (V) 160 to 450
	CV ≤ 1000 : Less than 0.1CV+40 (after 1 minute) CV > 1000 : Less than 0.04CV+100 (after 1 minute)
Characteristics at high and low temperature	C : Rated capacitance (μF) V : Rated voltage (V) (20°C)
	Impedance ratio (max.) Z-25°C/Z+20°C Z-40°C/Z+20°C
Endurance (85°C) (Applied ripple current)	Test time 2000 hours
	Leakage current The initial specified value or less
Shelf life (85°C)	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)

Miniature Aluminum Electrolytic Capacitors

Outline Drawing

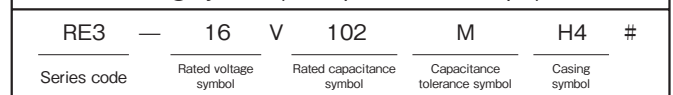
Unit : mm



Coefficient of Frequency for Rated Ripple Current

Rated voltage (V)	Frequency (Hz)	CV (μF×VV)				
		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
	≤ 1000	0.8	1	1.3	1.5	1.6
160 to 450	All CV value	0.8	1	1.3	1.5	1.6

Part numbering system (example : 16V1000μF)



Casing symbol

Size φD×L (mm)	Casing Symbol	Size φD×L (mm)	Casing Symbol
5×11	E3	12.5×25	I6
6.3×11	F3	16×25	J6
8×11.5	G3	16×31.5	J7
10×12.5	H3	16×35.5	J8
10×16	H4	18×35.5	K8
10×20	H5	18×40	K9
12.5×20	I5		

- 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 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								
		$\phi$ D×L (mm)	$\Omega$	mArms	$\phi$ D×L (mm)	$\Omega$	mArms	$\phi$ D×L (mm)	$\Omega$	mArms	$\phi$ D×L (mm)	$\Omega$	mArms	$\phi$ D×L (mm)	$\Omega$	mArms	$\phi$ D×L (mm)	$\Omega$	mArms	$\phi$ D×L (mm)	$\Omega$	mArms	$\phi$ D×L (mm)	$\Omega$	mArms								
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	1990	3	—	—	—	5×11	1330	2.1									
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	905	6	—	—	—	5×11	603	4.7									
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	603	9	—	—	—	5×11	402	7									
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	423	13	—	—	—	5×11	282	10									
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	199	21	—	—	—	5×11	133	21									
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	90.5	31	—	—	—	5×11	60.3	30									
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	60.3	38	—	—	—	5×11	40.2	40									
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	56.5	38	5×11	49.4	40	5×11	42.3	45	5×11	35.3	45	5×11	28.2	45			
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	33.2	50	5×11	26.5	55	5×11	23.2	59	5×11	19.9	66	5×11	16.6	66	6.3×11	13.3	75
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	15.1	75	5×11	12.1	82	5×11	10.6	87	5×11	9.05	98	5×11	7.54	100	6.3×11	6.03	130
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	10.1	92	5×11	8.04	100	5×11	7.04	107	5×11	6.03	126	6.3×11	5.03	140	8×11.5	4.02	180
47	—	—	—	5×11	8.47	99	5×11	7.06	110	5×11	5.65	118	5×11	4.94	130	6.3×11	4.23	155	6.3×11	3.53	170	10×12.5	2.82	230									
100	—	—	—	5×11	3.78	146	5×11	3.32	160	6.3×11	2.65	199	6.3×11	2.32	214	8×11.5	1.99	260	10×12.5	1.66	300	10×20	1.33	370									
220	5×11	2.11	200	6.3×11	1.81	240	6.3×11	1.51	264	8×11.5	1.21	349	10×12.5	1.06	443	10×12.5	0.905	443	10×16	7.54	470	12.5×20	0.603	620									
330	6.3×11	1.41	270	6.3×11	1.21	290	8×11.5	1.01	383	10×12.5	0.804	510	10×12.5	0.704	542	10×16	0.603	595	10×20	0.503	710	12.5×25	0.402	760									
470	6.3×11	0.988	322	8×11.5	0.847	417	8×11.5	0.706	457	10×12.5	0.565	545	10×16	0.494	664	12.5×20	0.423	887	12.5×20	0.353	900	16×25	0.282	1000									
1000	8×11.5	0.464	546	10×12.5	0.398	650	10×16	0.332	791	10×20	0.265	996	12.5×20	0.232	1210	12.5×25	0.199	1400	16×25	0.166	1300	18×40	0.133	1380									
2200	10×20	0.226	1010	10×20	0.196	1080	12.5×20	0.166	1350	12.5×25	0.136	1660	16×25	0.121	1950	16×35.5	0.106	2340	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
3300	10×20	0.161	1230	12.5×20	0.141	1430	12.5×25	0.121	1690	16×25	0.101	2030	16×35.5	0.09	2510	18×35.5	0.08	2810	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
4700	12.5×20	0.12	1710	12.5×25	0.106	1780	16×25	0.092	2100	16×31.5	0.078	2650	18×35.5	0.071	2990	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
6800	12.5×25	0.093	1930	16×25	0.083	2200	16×35.5	0.073	2580	18×35.5	0.063	3290	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
10000	16×25	0.076	2450	16×35.5	0.07	2700	18×35.5	0.063	3130	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
15000	16×35.5	0.062	2860	18×35.5	0.058	3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
22000	18×40	0.053	3340	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

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									
		$\phi$ D×L (mm)	$\Omega$	mArms	$\phi$ D×L (mm)	$\Omega$	mArms	$\phi$ D×L (mm)	$\Omega$	mArms	$\phi$ D×L (mm)	$\Omega$	mArms	$\phi$ D×L (mm)	$\Omega$	mArms	$\phi$ D×L (mm)	$\Omega$	mArms	$\phi$ D×L (mm)	$\Omega$	mArms									
0.47	6.3×11	706	15	6.3×11	706	15	6.3×11	706	15	6.3×11	847	15	6.3×11	847	15	6.3×11	847	15	8×11.5	847	18										
1	6.3×11	332	22	6.3×11	332	22	6.3×11	332	22	6.3×11	398	22	6.3×11	398	22	6.3×11	398	22	8×11.5	398	25										
2.2	6.3×11	151	32	6.3×11	151	32	6.3×11	151	32	8×11.5	181	38	8×11.5	181	38	8×11.5	181	38	10×12.5	181	43										
3.3	6.3×11	101	40	6.3×11	101	40	8×11.5	101	48	10×12.5	121	53	10×12.5	121	53	10×12.5	121	54	10×16	121	59										
4.7	6.3×11	70.6	48	8×11.5	70.6	56	8×11.5	70.6	56	10×12.5	84.7	65	10×12.5	84.7	65	10×16	84.7	71	10×20	84.7	76										
10	8×11.5	33.2	81	10×12.5	33.2	94	10×16	33.2	101	10×20	39.8	115	10×20	39.8	115	12.5×20	39.8	123	12.5×20	39.8	123										
22	10×16	15.1	151	10×20	15.1	170	12.5×20	15.1	182	12.5×20	18.1	182	12.5×25	18.1	197	12.5×25	18.1	197	16×25	18.1	226										
33	10×20	10.1	202	12.5×20	10.1	223	12.5×25	10.1	243	16×25	12.1	277	16×25	12.1	277	16×25	12.1	277	16×31.5	12.1	304										
47	12.5×20	7.06	266	12.5×25	7.06	265	12.5×25	7.06	295	16×25	8.47	330	16×25	8.47	330	16×31.5	8.47	361	16×35.5	8.47	380										
100	12.5×25	3.32	422	16×25	3.32	483	16×31.5	3.32	528	18×31.5	3.98	567	18×31.5	3.98	567	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
220	16×31.5	1.51	783	18×35.5	1.51	882	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
330	18×35.5	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.



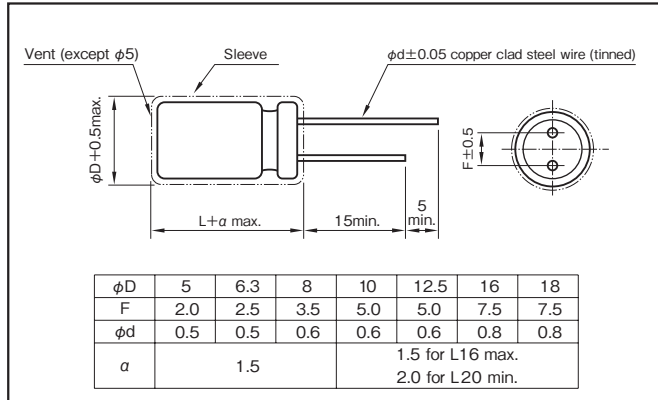
Marking color : White print on a blue sleeve

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	
	tan δ (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
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

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	1.1	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)

R2B	—	10	V	102	M	I5	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

Casing symbol

Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol
5×11	E3	10×12.5	H3	12.5×20	I5	16×31.5	J7
6.3×11	F3	10×16	H4	12.5×25	I6	16×35.5	J8
8×11.5	G3	10×20	H5	16×25	J6	18×35.5	K8

Standard Ratings

Rated capacitance (µF)	6.3		10		16		25		35		50		63		100	
	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms
0.1	—	—	—	—	—	—	—	—	—	—	5×11	4	—	—	5×11	5
0.22	—	—	—	—	—	—	—	—	—	—	5×11	7	—	—	5×11	8
0.33	—	—	—	—	—	—	—	—	—	—	5×11	8	—	—	5×11	9
0.47	—	—	—	—	—	—	—	—	—	—	5×11	10	—	—	5×11	11
1	—	—	—	—	—	—	—	—	—	—	5×11	14	—	—	5×11	16
2.2	—	—	—	—	—	—	—	—	—	—	5×11	21	5×11	23	5×11	24
3.3	—	—	—	—	—	—	—	—	—	—	5×11	26	5×11	28	6.3×11	34
4.7	—	—	—	—	—	—	5×11	28	5×11	28	5×11	31	5×11	34	6.3×11	41
10	—	—	—	—	5×11	39	5×11	40	5×11	42	5×11	45	6.3×11	57	8×11.5	70
22	—	—	5×11	52	5×11	58	5×11	60	6.3×11	71	6.3×11	77	8×11.5	89	10×16	136
33	5×11	58	5×11	63	5×11	71	6.3×11	84	6.3×11	87	8×11.5	111	10×12.5	144	10×20	181
47	5×11	69	5×11	75	6.3×11	97	6.3×11	100	8×11.5	122	10×12.5	157	10×16	188	12.5×20	248
100	6.3×11	115	6.3×11	126	8×11.5	167	10×12.5	204	10×12.5	212	10×20	273	12.5×20	343	16×25	458
220	8×11.5	202	8×11.5	221	10×12.5	294	10×16	332	10×20	375	12.5×25	506	16×25	645	18×35.5	837
330	8×11.5	247	10×12.5	322	10×16	394	10×20	444	12.5×20	526	12.5×25	620	—	—	—	—
470	10×12.5	350	10×16	420	10×20	513	12.5×20	607	12.5×25	685	16×25	861	—	—	—	—
1000	10×20	611	12.5×20	767	12.5×25	935	16×25	1120	16×31.5	1270	—	—	—	—	—	—
2200	12.5×25	1090	16×25	1380	16×31.5	1660	—	—	—	—	—	—	—	—	—	—
3300	16×25	1490	16×31.5	1760	—	—	—	—	—	—	—	—	—	—	—	—
4700	16×31.5	1880	18×35.5	2280	—	—	—	—	—	—	—	—	—	—	—	—

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

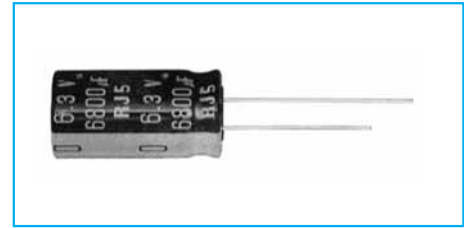
NOTE

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

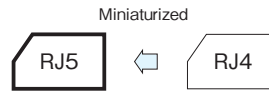
## 105°C Miniature Capacitors

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

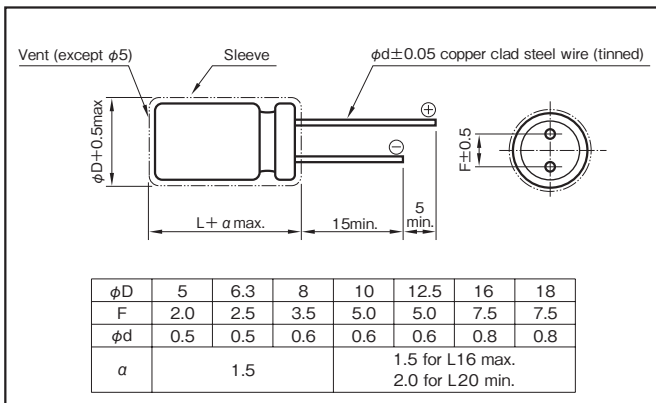


### Specifications

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"> <tbody> <tr> <td>Test time</td> <td>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 ±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																		
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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

### 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 φD×L (mm)	Casing Symbol	Size φD×L (mm)	Casing Symbol
5×11	E3	12.5×25	I6
6.3×11	F3	16×25	J6
8×11.5	G3	16×31.5	J7
10×12.5	H3	16×35.5	J8
10×16	H4	18×35.5	K8
10×20	H5	18×40	K9
12.5×20	I5		

### NOTE

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

Standard Ratings

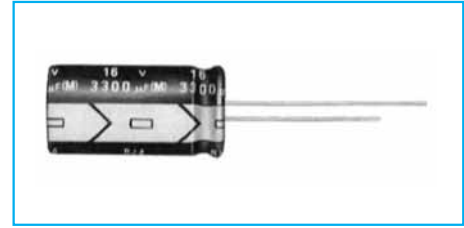
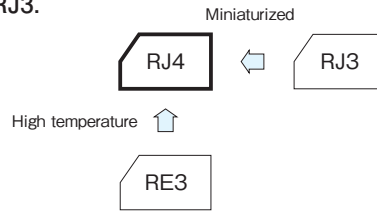
Rated capacitance (μF)	6.3		10		16		25		35		50		63		100	
	Item		Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms
0.1	—	—	—	—	—	—	—	—	—	—	5×11	3	—	—	5×11	1.5
0.22	—	—	—	—	—	—	—	—	—	—	5×11	6	—	—	5×11	3.4
0.33	—	—	—	—	—	—	—	—	—	—	5×11	9	—	—	5×11	5
0.47	—	—	—	—	—	—	—	—	—	—	5×11	10	—	—	5×11	7.1
1	—	—	—	—	—	—	—	—	—	—	5×11	15	—	—	5×11	15
2.2	—	—	—	—	—	—	—	—	—	—	5×11	22	—	—	5×11	21
3.3	—	—	—	—	—	—	—	—	—	—	5×11	27	—	—	5×11	29
4.7	—	—	—	—	—	—	—	—	—	—	5×11	32	—	—	5×11	32
10	—	—	—	—	—	—	—	—	—	—	5×11	47	—	—	5×11	50
22	—	—	—	—	—	—	—	—	—	—	5×11	70	5×11	71	6.3×11	93
33	—	—	—	—	—	—	—	—	—	—	5×11	90	6.3×11	100	8×11.5	130
47	—	—	—	—	—	—	—	—	5×11	93	6.3×11	115	6.3×11	120	8×11.5	140
68	—	—	—	—	—	—	—	—	6.3×11	110	6.3×11	150	8×11.5	155	10×12.5	190
100	—	—	—	—	—	—	5×11	125	6.3×11	151	8×11.5	190	8×11.5	200	10×16	240
220	—	—	5×11	155	6.3×11	190	6.3×11	200	8×11.5	270	10×12.5	314	10×16	335	12.5×20	390
330	—	—	6.3×11	210	6.3×11	225	8×11.5	310	10×12.5	384	10×16	421	10×20	510	—	—
470	—	—	6.3×11	250	8×11.5	323	10×12.5	429	10×16	470	10×20	540	12.5×20	640	16×25	715
1000	8×11.5	398	10×12.5	460	10×12.5	500	10×16	610	12.5×20	857	12.5×25	1000	16×25	930	18×35.5	960
2200	10×16	635	10×16	705	10×20	710	12.5×25	1180	16×25	1380	16×31.5	1410	18×35.5	1650	—	—
3300	10×20	882	12.5×20	1010	12.5×25	1200	16×25	1440	16×31.5	1500	18×35.5	1990	—	—	—	—
4700	12.5×20	1120	12.5×25	1260	16×25	1500	16×25	1570	16×35.5	1780	—	—	—	—	—	—
6800	12.5×25	1380	16×25	1570	16×25	1600	16×35.5	1850	18×40	2000	—	—	—	—	—	—
10000	16×25	1750	16×31.5	1820	16×35.5	1930	18×40	2000	—	—	—	—	—	—	—	—
15000	16×31.5	1820	16×35.5	2050	18×40	2210	—	—	—	—	—	—	—	—	—	—
22000	18×35.5	2280	18×40	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. (φ5 to φ8 : 1000 hours)



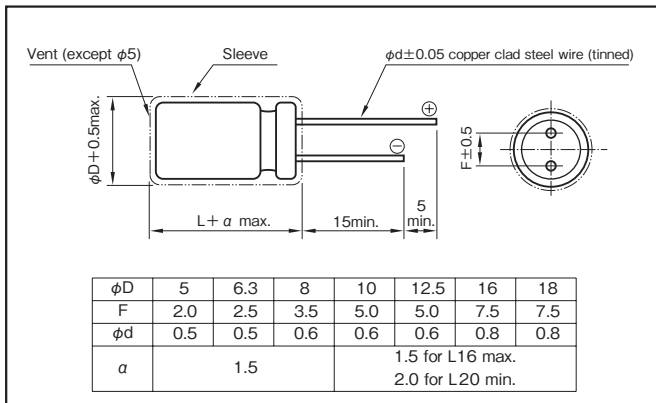
Marking color : White print on a black sleeve

### 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 0.03CV 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> <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>0.28</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> <td>Rated voltage (V)</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>0.20</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> <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>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> <td>Rated voltage (V)</td> <td>160 to 250</td><td>315 to 450</td> </tr> <tr> <td rowspan="2">Impedance ratio (max.)</td> <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																																			
		(120Hz)																																				
Endurance (105°C) (Applied ripple current)	Test time	2000 hours (φ5 to φ8 : 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 : 16V2200µF)

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

### Casing symbol

Size φD×L (mm)	Casing Symbol	Size φD×L (mm)	Casing Symbol
5×11	E3	12.5×25	I6
6.3×11	F3	16×25	J6
8×11.5	G3	16×31.5	J7
10×12.5	H3	16×35.5	J8
10×16	H4	18×31.5	K7
10×20	H5	18×35.5	K8
12.5×20	I5	18×40	K9

### NOTE

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

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×L (mm)	Ω	mA <sub>rms</sub>	φD×L (mm)	Ω	mA <sub>rms</sub>	φD×L (mm)	Ω	mA <sub>rms</sub>	φD×L (mm)	Ω	mA <sub>rms</sub>	φD×L (mm)	Ω	mA <sub>rms</sub>	φD×L (mm)	Ω	mA <sub>rms</sub>	φD×L (mm)	Ω	mA <sub>rms</sub>	φD×L (mm)	Ω	mA <sub>rms</sub>								
0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	1990	3	—	—	—	5×11	1327	1.5									
0.22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	905	6	—	—	—	5×11	603	3.4									
0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	603	9	—	—	—	5×11	402	5									
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	424	10	—	—	—	5×11	282	7.1									
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	199	15	—	—	—	5×11	133	15									
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	90.5	22	—	—	—	5×11	60.3	21									
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	60.3	27	—	—	—	5×11	40.2	29									
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	56.5	27	5×11	49.4	30	5×11	42.4	32	—	—	—	5×11	28.2	32			
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	33.2	37	5×11	26.5	39	5×11	23.2	43	5×11	19.9	47	5×11	16.6	46	6.3×11	13.3	54
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	15.1	54	5×11	12.1	58	5×11	10.6	64	5×11	9.05	70	5×11	7.54	71	6.3×11	6.03	93
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	10.1	67	5×11	8.04	71	5×11	7.04	78	5×11	6.03	90	6.3×11	5.03	100	8×11.5	4.02	130
47	—	—	—	5×11	8.47	72	5×11	7.06	79	5×11	5.65	84	5×11	4.94	90	6.3×11	4.24	115	6.3×11	3.53	120	10×12.5	2.82	165									
100	—	—	—	5×11	3.98	105	5×11	3.32	115	6.3×11	2.65	141	6.3×11	2.32	151	8×11.5	1.99	190	10×12.5	1.66	215	10×20	1.33	265									
220	5×11	2.11	140	6.3×11	1.81	166	6.3×11	1.51	190	8×11.5	1.21	247	10×12.5	1.06	314	10×12.5	0.91	314	10×16	0.75	335	12.5×25	0.60	440									
330	6.3×11	1.41	195	6.3×11	1.21	210	8×11.5	1.01	271	10×12.5	0.81	360	10×12.5	0.70	384	10×16	0.60	421	10×20	0.50	510	12.5×25	0.40	540									
470	6.3×11	0.99	232	8×11.5	0.85	325	8×11.5	0.71	323	10×12.5	0.57	429	10×16	0.50	470	12.5×20	0.42	628	12.5×20	0.35	640	16×25	0.28	715									
1000	8×11.5	0.47	398	10×12.5	0.40	457	10×16	0.33	560	10×20	0.27	705	12.5×20	0.23	857	12.5×25	0.20	1000	16×25	0.17	930	18×40	0.13	985									
2200	10×20	0.23	720	10×20	0.20	761	12.5×20	0.17	961	12.5×25	0.14	1180	16×25	0.12	1380	16×35.5	0.11	1660	—	—	—	—	—	—									
3300	10×20	0.16	882	12.5×20	0.14	1010	12.5×25	0.12	1200	16×25	0.10	1440	16×35.5	0.09	1780	18×35.5	0.08	1990	—	—	—	—	—	—									
4700	12.5×20	0.12	1120	12.5×25	0.11	1250	16×25	0.09	1490	16×31.5	0.08	1880	18×35.5	0.07	2120	—	—	—	—	—	—	—	—	—									
6800	12.5×25	0.09	1380	16×25	0.08	1570	16×35.5	0.07	1830	18×35.5	0.06	2330	—	—	—	—	—	—	—	—	—	—	—	—									
10000	16×25	0.07	1750	16×35.5	0.07	1910	18×35.5	0.06	2220	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—									
15000	16×35.5	0.06	2040	18×35.5	0.06	2190	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—									
22000	18×40	0.05	2390	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—									

Miniature Aluminum Electrolytic Capacitors

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×L (mm)	Ω	mA <sub>rms</sub>	φD×L (mm)	Ω	mA <sub>rms</sub>	φD×L (mm)	Ω	mA <sub>rms</sub>	φD×L (mm)	Ω	mA <sub>rms</sub>	φD×L (mm)	Ω	mA <sub>rms</sub>	φD×L (mm)	Ω	mA <sub>rms</sub>	φD×L (mm)	Ω	mA <sub>rms</sub>	
0.47	6.3×11	706	11	6.3×11	706	11	6.3×11	706	11	6.3×11	847	11	6.3×11	847	11	6.3×11	847	11	8×11.5	847	13		
1	6.3×11	332	16	6.3×11	332	16	6.3×11	332	16	6.3×11	398	16	6.3×11	398	16	6.3×11	398	16	8×11.5	398	18		
2.2	6.3×11	151	23	6.3×11	151	23	6.3×11	151	23	8×11.5	181	27	8×11.5	181	27	8×11.5	181	27	10×12.5	181	31		
3.3	6.3×11	101	28	6.3×11	101	28	8×11.5	101	34	10×12.5	121	38	10×12.5	121	38	10×12.5	121	38	10×16	121	42		
4.7	6.3×11	70.6	34	8×11.5	70.6	40	8×11.5	70.6	40	10×12.5	84.7	45	10×12.5	84.7	45	10×16	84.7	50	10×20	84.7	54		
10	8×11.5	33.2	58	10×12.5	33.2	66	10×16	33.2	74	10×20	39.8	79	10×20	39.8	79	12.5×20	39.8	87	12.5×20	39.8	87		
22	10×16	15.1	107	10×20	15.1	120	12.5×20	15.1	130	12.5×20	18.1	129	12.5×25	18.1	140	12.5×25	18.1	140	16×25	18.1	160		
33	10×20	10.1	143	12.5×20	10.1	160	12.5×25	10.1	172	16×25	12.1	196	16×25	12.1	196	16×25	12.1	196	16×31.5	12.1	215		
47	12.5×20	7.06	188	12.5×20	7.06	188	12.5×25	7.06	205	16×25	8.47	234	16×25	8.47	234	16×31.5	8.47	256	16×35.5	8.47	269		
100	12.5×25	3.32	299	16×25	3.32	342	16×31.5	3.32	374	18×31.5	3.98	401	18×31.5	3.98	401	—	—	—	—	—	—	—	
220	16×31.5	1.51	554	18×35.5	1.51	624	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
330	18×35.5	1.01	764	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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

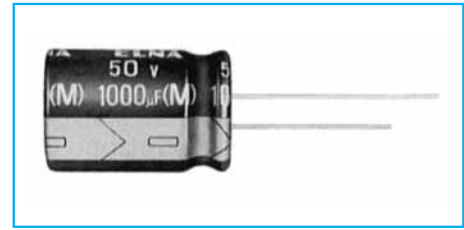
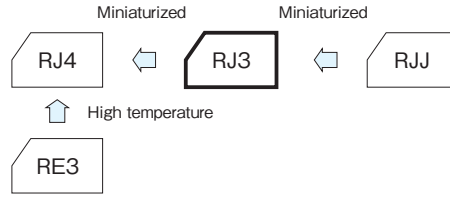
NOTE

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

## 105°C Use, Standard Capacitors

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

• Guarantees 2000 hours at 105°C ( $\phi 5 \sim 8$  : 1000 hours).



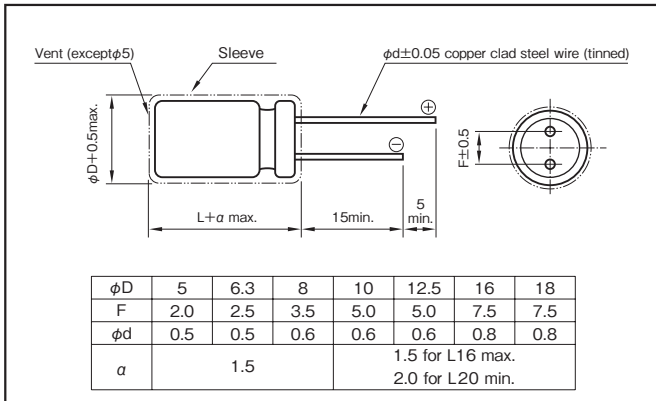
Marking color : White print on a black sleeve

## 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)																																					
	C : Rated capacitance (µF) V : Rated voltage (V)																																					
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><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 ( $\phi 5$ to $\phi 8$ : 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 : 63V1000µF)

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

## Casing symbol

Size φD×L (mm)	Casing Symbol	Size φD×L (mm)	Casing Symbol
5×11	E3	12.5×25	I6
6.3×11	F3	16×25	J6
8×11.5	G3	16×31.5	J7
10×12.5	H3	16×35.5	J8
10×16	H4	18×35.5	K8
10×20	H5	18×40	K9
12.5×20	I5		

## NOTE

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

Aluminum Electrolytic Capacitors Miniature

Standard Ratings

Rated voltage (V)	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
		φD×L (mm)	Ω	Ω	mArms	φD×L (mm)	Ω	Ω	mArms	φD×L (mm)	Ω	Ω	mArms	φD×L (mm)	Ω	Ω	mArms
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	49.4	3.0	85
10	—	—	—	—	—	—	—	—	—	5×11	26.5	2.5	92	5×11	23.2	2.5	92
22	—	—	—	—	5×11	14.3	2.5	92	5×11	12.1	1.9	105	5×11	10.6	1.9	105	
33	5×11	11.1	2.5	105	5×11	9.55	1.9	105	5×11	8.04	1.5	120	5×11	7.04	1.5	120	
47	5×11	7.77	1.5	120	5×11	6.71	1.5	120	5×11	5.65	1.2	130	5×11	4.94	1.2	130	
100	5×11	3.65	1.2	130	5×11	3.15	1.2	130	6.3×11	2.65	0.58	220	6.3×11	2.32	0.58	220	
220	6.3×11	1.66	0.87	180	6.3×11	1.43	0.58	220	8×11.5	1.21	0.47	290	8×11.5	1.06	0.39	315	
330	6.3×11	1.11	0.58	220	8×11.5	0.96	0.47	265	8×11.5	0.81	0.39	315	10×12.5	0.70	0.23	500	
470	8×11.5	0.78	0.39	315	8×11.5	0.67	0.39	315	10×12.5	0.57	0.23	500	10×16	0.50	0.18	615	
1000	10×12.5	0.37	0.23	500	10×16	0.32	0.18	615	10×20	0.27	0.12	825	12.5×20	0.23	0.090	1050	
2200	12.5×20	0.18	0.095	1000	12.5×20	0.16	0.090	1050	12.5×25	0.14	0.068	1300	16×25	0.12	0.056	1740	
3300	12.5×20	0.13	0.090	1050	12.5×25	0.12	0.068	1300	16×25	0.10	0.056	1740	16×31.5	0.09	0.045	2110	
4700	16×25	0.10	0.061	1670	16×25	0.09	0.056	1740	16×31.5	0.08	0.045	2110	18×35.5	0.07	0.036	2580	
6800	16×25	0.08	0.056	1740	16×31.5	0.07	0.045	2110	18×35.5	0.06	0.036	2580	—	—	—	—	
10000	16×31.5	0.06	0.045	2110	18×35.5	0.06	0.036	2580	—	—	—	—	—	—	—	—	
15000	18×35.5	0.05	0.036	2580	—	—	—	—	—	—	—	—	—	—	—	—	

Rated voltage (V)	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
		φD×L (mm)	Ω	Ω	mArms	φD×L (mm)	Ω	Ω	mArms	φD×L (mm)	Ω	Ω	mArms	φD×L (mm)	Ω	Ω	mArms
0.1	—	—	—	—	5×11	1659	18	10	—	—	—	—	—	—	—	—	
0.22	—	—	—	—	5×11	754	13	15	—	—	—	—	—	—	—	—	
0.33	—	—	—	—	5×11	503	10	18	—	—	—	—	—	—	—	—	
0.47	—	—	—	—	5×11	353	7.0	23	—	—	—	—	5×11	282	13	30	
1	—	—	—	—	5×11	166	4.9	35	—	—	—	—	5×11	133	11	45	
2.2	—	—	—	—	5×11	75.4	4.2	53	—	—	—	—	5×11	60.3	9.2	60	
3.3	—	—	—	—	5×11	50.3	3.9	65	—	—	—	—	5×11	40.2	7.2	67	
4.7	5×11	42.4	2.5	92	5×11	35.3	3.6	82	5×11	31.8	5.8	74	5×11	28.2	6.3	75	
10	5×11	19.9	1.9	105	5×11	16.6	2.7	100	5×11	14.9	3.6	95	6.3×11	13.3	3.3	110	
22	5×11	9.05	1.5	120	5×11	7.54	1.9	125	6.3×11	6.79	2.1	130	8×11.5	6.03	1.4	165	
33	5×11	6.03	1.2	130	6.3×11	5.03	1.1	195	6.3×11	4.52	1.7	160	10×12.5	4.02	0.94	305	
47	6.3×11	4.24	0.58	220	6.3×11	3.53	0.90	245	8×11.5	3.18	1.2	305	10×16	2.82	0.68	320	
100	8×11.5	1.99	0.39	315	8×11.5	1.66	0.50	385	10×12.5	1.49	0.65	395	12.5×20	1.33	0.28	585	
220	10×12.5	0.91	0.23	500	10×16	0.75	0.27	505	10×20	0.68	0.32	505	16×25	0.60	0.16	1120	
330	10×16	0.60	0.18	615	10×20	0.50	0.18	675	12.5×20	0.45	0.22	660	16×25	0.40	0.13	1290	
470	10×20	0.42	0.12	825	12.5×20	0.35	0.12	895	12.5×25	0.32	0.16	850	16×31.5	0.28	0.11	1350	
1000	12.5×25	0.20	0.068	1300	16×25	0.17	0.076	1495	16×31.5	0.15	0.098	1430	—	—	—	—	
2200	16×31.5	0.11	0.045	2110	18×35.5	0.09	0.050	2190	—	—	—	—	—	—	—	—	
3300	18×35.5	0.08	0.036	2580	—	—	—	—	—	—	—	—	—	—	—	—	

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

Rated voltage (V)	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
		φD×L (mm)	Ω	mArms	φD×L (mm)	Ω	mArms	φD×L (mm)	Ω	mArms	φD×L (mm)	Ω	mArms	φD×L (mm)	Ω	mArms	φD×L (mm)	Ω	mArms
0.47	6.3×11	529	12	6.3×11	529	12	6.3×11	529	12	6.3×11	705	11	6.3×11	705	11	—	—	—	
1	6.3×11	248	18	6.3×11	248	18	6.3×11	248	18	6.3×11	331	16	6.3×11	331	18	8×11.5	331	18	
2.2	6.3×11	113	26	6.3×11	113	26	8×11.5	113	30	8×11.5	150	27	8×11.5	150	30	10×12.5	150	30	
3.3	8×11.5	75.4	37	8×11.5	75.4	37	10×12.5	75.4	43	10×12.5	100	36	10×12.5	100	36	10×16	100	40	
4.7	8×11.5	52.9	44	10×12.5	52.9	50	10×12.5	52.9	50	10×16	70.6	47	10×16	70.6	47	10×20	70.6	52	
10	10×12.5	24.9	75	10×16	24.9	80	10×20	24.9	90	10×20	33.2	75	12.5×20	33.2	79	12.5×20	33.2	79	
22	10×20	11.3	135	10×20	11.3	135	12.5×25	11.3	155	12.5×25	15.1	130	12.5×25	15.1	130	16×25	15.1	130	
33	12.5×20	7.54	175	12.5×25	7.54	190	12.5×25	7.54	190	16×25	10.1	160	16×25	10.1	160	16×31.5	10.1	175	
47	12.5×25	5.29	230	12.5×25	5.29	230	16×25	5.29	225	16×31.5	7.06	210	16×31.5	7.06	210	18×35.5	7.06	220	
100	16×25	2.49	330	16×31.5	2.49	360	18×35.5	2.49	340	18×40	3.32	335	18×40	3.32	335	—	—	—	
220	18×35.5	1.13	500	18×40	1.13	525	—	—	—	—	—	—	—	—	—	—	—	—	

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

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

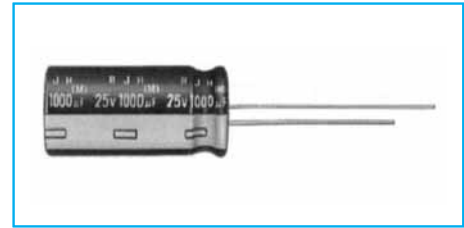
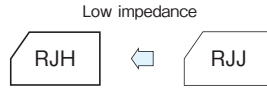
GREEN CAP

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.  
( $\phi 5$  to 6.3 : 2000 hours ;  $\phi 8$  to 10 : 3000 hours)



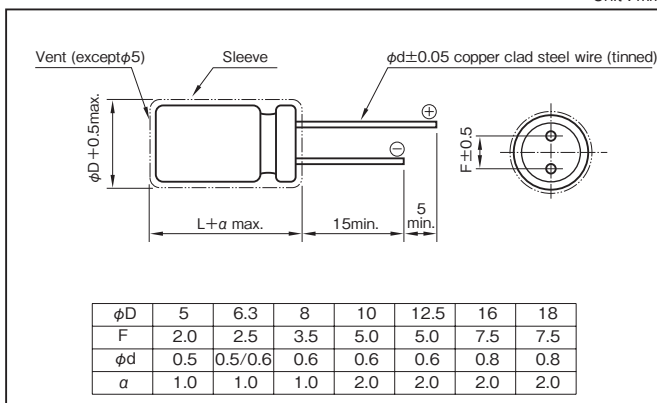
Marking color : White print on a black sleeve

### 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)	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	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	3
(120Hz)									
Endurance (105°C) (Applied ripple current)	Test time	5000 hours ( $\phi 5$ to 6.3 : 2000 hours) ( $\phi 8$ 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)								

### Outline Drawing

Unit : mm



### 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.

### NOTE

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

Aluminum Electrolytic Capacitors

Standard Ratings

Rated voltage (V)		6.3					10					
Case φD×L (mm)	Casing symbol	Item	Rated capacitance μF	ESR Ω	Impedance Ω/100kHz		Rated ripple current mArms	Rated capacitance μF	ESR Ω	Impedance Ω/100kHz		Rated ripple current mArms
					20°C	-10°C				20°C	-10°C	
5×11.5	E3		100	3.65	0.65	1.46	175	82	3.84	0.65	1.46	175
5×15	E4		150	2.43	0.46	1.04	235	100	3.15	0.46	1.04	235
6.3×11.5	F3		220	1.66	0.31	0.70	290	180	1.75	0.31	0.70	290
6.3×15	F4		330	1.11	0.20	0.45	400	220	1.43	0.20	0.45	400
8×12	G3		470	0.777	0.17	0.38	488	330	0.956	0.17	0.38	488
8×15	G4		680	0.537	0.13	0.29	617	470	0.671	0.13	0.29	617
8×20	G5		1000	0.365	0.095	0.21	800	680	0.464	0.095	0.21	800
10×12.5	H3		680	0.537	0.1	0.23	625	470	0.671	0.10	0.23	625
10×16	H4		820	0.446	0.08	0.18	825	560	0.563	0.080	0.18	825
10×20	H5		1200	0.305	0.062	0.14	1010	1000	0.316	0.062	0.14	1010
10×25	H6		1500	0.244	0.052	0.12	1190	1200	0.263	0.052	0.12	1190
10×30	H7		2200	0.181	0.044	0.099	1440	1500	0.211	0.044	0.099	1440
12.5×15	I4	•	1200	0.305	0.062	0.14	1010	• 1000	0.316	0.062	0.14	1010
12.5×20	I5		2200	0.181	0.042	0.095	1400	1800	0.176	0.042	0.095	1400
12.5×25	I6		2700	0.148	0.034	0.076	1690	2200	0.159	0.034	0.076	1690
12.5×30	I7		3900	0.111	0.03	0.068	1950	2700	0.130	0.030	0.068	1950
12.5×35	I8		4700	0.099	0.024	0.054	2220	3300	0.116	0.024	0.054	2220
12.5×40	I9		5600	0.089	0.021	0.047	2390	3900	0.098	0.021	0.047	2390
16×16	J4	•	2700	0.148	0.046	0.10	1310	• 1800	0.176	0.046	0.10	1310
16×20	J5	•	4700	0.099	0.034	0.077	1660	• 3300	0.116	0.034	0.077	1660
16×25	J6		5600	0.089	0.028	0.063	2070	3900	0.098	0.028	0.063	2070
16×31.5	J7		6800	0.079	0.025	0.056	2350	5600	0.080	0.025	0.056	2350
16×35.5	J8		8200	0.073	0.022	0.050	2550	6800	0.071	0.022	0.050	2550
16×40	J9		12000	0.059	0.018	0.041	2970	8200	0.067	0.018	0.041	2970
18×16	K4	•	3300	0.131	0.043	0.097	1460	• 2200	0.159	0.043	0.097	1460
18×20	K5	•	5600	0.089	0.030	0.068	1850	• 3900	0.098	0.030	0.068	1850
18×25	K6	•	6800	0.079	0.027	0.061	2120	• 4700	0.089	0.027	0.061	2120
18×31.5	K7		10000	0.064	0.023	0.052	2410	6800	0.071	0.023	0.052	2410
18×35.5	K8		12000	0.059	0.019	0.043	2680	8200	0.067	0.019	0.043	2680
18×40	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 φD×L (mm)	Casing symbol	Item	Rated capacitance μF	ESR Ω	Impedance Ω/100kHz		Rated ripple current mArms	Rated capacitance μF	ESR Ω	Impedance Ω/100kHz		Rated ripple current mArms
					20°C	-10°C				20°C	-10°C	
5×11.5	E3		56	4.74	0.65	1.46	175	39	5.96	0.65	1.46	175
5×15	E4		82	3.24	0.46	1.04	235	56	4.15	0.46	1.04	235
6.3×11.5	F3		120	2.21	0.31	0.70	290	82	2.83	0.31	0.70	290
6.3×15	F4		180	1.48	0.20	0.45	400	120	1.94	0.20	0.45	400
8×12	G3		270	0.983	0.17	0.38	488	180	1.29	0.17	0.38	488
8×15	G4		330	0.805	0.13	0.29	617	220	1.06	0.13	0.29	617
8×20	G5		470	0.565	0.095	0.21	800	330	0.704	0.095	0.21	800
10×12.5	H3		330	0.805	0.10	0.23	625	220	1.06	0.10	0.23	625
10×16	H4		390	0.681	0.080	0.18	825	270	0.861	0.080	0.18	825
10×20	H5		680	0.391	0.062	0.14	1010	470	0.495	0.062	0.14	1010
10×25	H6		820	0.324	0.052	0.12	1190	560	0.415	0.052	0.12	1190
10×30	H7		1200	0.222	0.044	0.099	1440	820	0.284	0.044	0.099	1440
12.5×15	I4	•	680	0.391	0.062	0.14	1010	• 470	0.495	0.062	0.14	1010
12.5×20	I5		1200	0.222	0.042	0.095	1400	820	0.284	0.042	0.095	1400
12.5×25	I6		1500	0.177	0.034	0.076	1690	1000	0.233	0.034	0.076	1690
12.5×30	I7		2200	0.136	0.030	0.068	1950	1500	0.155	0.030	0.068	1950
12.5×35	I8		2700	0.111	0.024	0.054	2220	1800	0.130	0.024	0.054	2220
12.5×40	I9		3300	0.101	0.021	0.047	2390	2200	0.121	0.021	0.047	2390
16×16	J4	•	1500	0.177	0.046	0.10	1310	• 820	0.284	0.046	0.10	1310
16×20	J5	•	2200	0.136	0.034	0.077	1660	• 1500	0.155	0.034	0.077	1660
16×25	J6		2700	0.111	0.028	0.063	2070	1800	0.130	0.028	0.063	2070
16×31.5	J7		3900	0.086	0.025	0.056	2350	2700	0.099	0.025	0.056	2350
16×35.5	J8		4700	0.078	0.022	0.050	2550	3300	0.091	0.022	0.050	2550
16×40	J9		5600	0.072	0.018	0.041	2970	3900	0.077	0.018	0.041	2970
18×16	K4	•	1500	0.177	0.043	0.097	1460	• 1200	0.194	0.043	0.097	1460
18×20	K5	•	2700	0.111	0.030	0.068	1850	• 1800	0.130	0.030	0.068	1850
18×25	K6	•	3900	0.086	0.027	0.061	2120	• 2700	0.099	0.027	0.061	2120
18×31.5	K7		4700	0.078	0.023	0.052	2410	3300	0.091	0.023	0.052	2410
18×35.5	K8		6800	0.064	0.019	0.043	2680	3900	0.077	0.019	0.043	2680
18×40	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

Rated voltage (V)			35					50				
Case φD×L (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
5×11.5	E3		—	—	—	—	—	0.47	353	3.9	7.8	22
5×11.5	E3		—	—	—	—	—	1	166	3.5	7.0	36
5×11.5	E3		—	—	—	—	—	2.2	75.4	3.0	6.0	54
5×11.5	E3		—	—	—	—	—	3.3	50.3	2.6	5.2	63
5×11.5	E3		—	—	—	—	—	4.7	35.3	2.2	4.4	75
5×11.5	E3		—	—	—	—	—	10	16.6	1.4	2.8	110
5×11.5	E3		27	7.37	0.65	1.46	175	18	9.22	0.95	1.9	120
5×15	E4		39	5.10	0.46	1.04	235	27	6.14	0.66	1.32	135
6.3×11.5	F3		56	3.56	0.31	0.70	290	39	4.25	0.43	0.86	148
6.3×15	F4		82	2.43	0.20	0.45	400	56	2.96	0.33	0.66	153
8×12	G3		120	1.66	0.17	0.38	488	68	2.44	0.20	0.40	360
8×15	G4		180	1.11	0.13	0.29	617	82	2.02	0.18	0.36	460
8×20	G5		220	0.905	0.095	0.21	800	120	1.38	0.13	0.26	670
10×12.5	H3		150	1.33	0.10	0.23	625	82	2.02	0.18	0.36	443
10×16	H4		180	1.11	0.080	0.18	825	100	1.66	0.15	0.30	553
10×20	H5		330	0.604	0.062	0.14	1010	180	0.922	0.085	0.17	676
10×25	H6		390	0.511	0.052	0.12	1190	220	0.754	0.075	0.15	876
10×30	H7		560	0.356	0.044	0.099	1440	330	0.503	0.055	0.110	1010
12.5×15	I4	•	330	0.604	0.062	0.140	1010	• 180	0.922	0.095	0.190	745
12.5×20	I5		560	0.356	0.042	0.095	1400	330	0.503	0.060	0.120	979
12.5×25	I6		680	0.293	0.034	0.076	1690	470	0.353	0.044	0.088	1180
12.5×30	I7		1000	0.200	0.030	0.068	1950	560	0.297	0.040	0.080	1310
12.5×35	I8		1200	0.166	0.024	0.054	2220	680	0.244	0.036	0.072	1470
12.5×40	I9		1500	0.133	0.021	0.047	2390	820	0.203	0.034	0.068	1590
16×16	J4	•	560	0.356	0.046	0.10	1310	• 330	0.503	0.065	0.130	982
16×20	J5	•	1000	0.200	0.034	0.077	1660	• 680	0.244	0.045	0.090	1210
16×25	J6		1200	0.166	0.028	0.063	2070	820	0.203	0.038	0.076	1490
16×31.5	J7		1800	0.111	0.025	0.056	2350	1000	0.166	0.032	0.064	1890
16×35.5	J8		2200	0.106	0.022	0.050	2550	1200	0.139	0.028	0.056	2140
16×40	J9		2700	0.087	0.018	0.041	2970	1500	0.111	0.026	0.052	2410
18×16	K4	•	680	0.293	0.043	0.097	1460	• 470	0.353	0.048	0.096	1180
18×20	K5	•	1200	0.166	0.030	0.068	1850	• 820	0.203	0.036	0.072	1450
18×25	K6	•	1800	0.111	0.027	0.061	2120	• 1000	0.166	0.032	0.064	1720
18×31.5	K7		2200	0.106	0.023	0.052	2410	1500	0.111	0.026	0.052	1970
18×35.5	K8		2700	0.087	0.019	0.043	2680	1800	0.074	0.025	0.050	2310
18×40	K9		3300	0.081	0.017	0.038	3010	2200	0.073	0.024	0.048	2530

Miniature Aluminum Electrolytic Capacitors

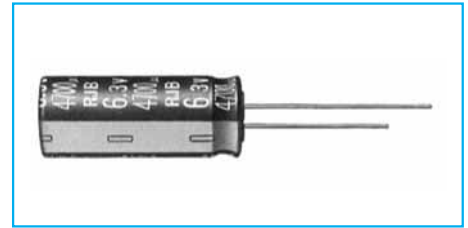
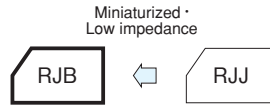
Rated voltage (V)			63					100				
Case φD×L (mm)	Casing symbol	Item	Rated capacitance	ESR	Impedance Ω/100kHz		Rated ripple current	Rated capacitance	ESR	Impedance Ω/100kHz		Rated ripple current
			μF	Ω	20°C	-10°C	mArms	μF	Ω	20°C	-10°C	mArms
5×11.5	E3		12	11.1	1.2	3.6	120	5.6	20.7	1.9	7.6	57
5×15	E4		18	7.37	0.85	2.6	135	8.2	14.2	1.3	5.2	74
6.3×11.5	F3		27	4.92	0.55	1.7	148	12	9.68	1.1	4.4	78
6.3×15	F4		39	3.40	0.38	1.1	153	18	6.45	0.62	2.5	85
8×12	G3		47	2.82	0.32	0.96	360	22	5.28	0.53	2.1	275
8×15	G4		68	1.95	0.24	0.72	469	33	3.52	0.35	1.4	360
8×20	G5		82	1.62	0.17	0.51	682	39	2.98	0.27	1.1	490
10×12.5	H3		56	2.37	0.23	0.69	448	27	4.30	0.47	1.9	319
10×16	H4		68	1.95	0.17	0.51	553	33	3.52	0.32	1.3	424
10×20	H5		120	1.11	0.12	0.36	676	56	2.07	0.25	0.1	499
10×25	H6		150	0.885	0.10	0.30	876	68	1.71	0.18	0.72	634
10×30	H7		180	0.738	0.085	0.26	1020	100	1.16	0.15	0.60	739
12.5×15	I4	•	150	0.885	0.11	0.33	745	• 68	1.71	0.20	0.80	613
12.5×20	I5		220	0.604	0.075	0.23	979	100	1.16	0.13	0.52	805
12.5×25	I6		270	0.492	0.065	0.20	1180	120	0.968	0.11	0.44	857
12.5×30	I7		390	0.341	0.055	0.17	1310	180	0.646	0.090	0.36	1120
12.5×35	I8		470	0.283	0.048	0.14	1470	220	0.528	0.075	0.30	1240
12.5×40	I9		560	0.237	0.042	0.13	1590	270	0.431	0.060	0.24	1330
16×16	J4	•	220	0.604	0.080	0.24	982	• 120	0.968	0.130	0.52	706
16×20	J5	•	390	0.341	0.057	0.17	1210	• 180	0.646	0.11	0.44	916
16×25	J6		470	0.283	0.052	0.16	1490	220	0.528	0.081	0.32	1290
16×31.5	J7		680	0.196	0.042	0.13	1890	330	0.352	0.059	0.23	1630
16×35.5	J8		820	0.162	0.036	0.11	2140	390	0.298	0.052	0.21	1750
16×40	J9		1000	0.133	0.032	0.096	2410	470	0.248	0.045	0.18	1920
18×16	K4	•	330	0.403	0.065	0.20	1200	• 150	0.775	0.12	0.48	871
18×20	K5	•	560	0.237	0.058	0.17	1460	• 270	0.431	0.085	0.34	1170
18×25	K6	•	680	0.196	0.050	0.15	1740	• 330	0.352	0.071	0.28	1500
18×31.5	K7		820	0.162	0.042	0.13	1990	390	0.298	0.058	0.23	1630
18×35.5	K8		1000	0.133	0.035	0.11	2340	560	0.208	0.054	0.22	1920
18×40	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.  
(φ 5 to 6.3 : 2000 hours ; φ 8 to 10 : 3000 hours)



Marking color : White print on a black sleeve

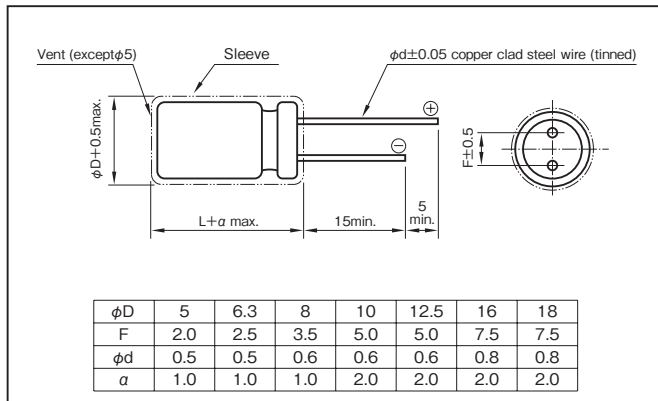
Specifications

Item	Performance																		
Category temperature range (°C)	-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 (φ5 to 6.3 : 2000 hours) (φ8 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.

NOTE

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

## Standard Ratings

Rated voltage (V) Rated capacitance (μF)	Item	6.3					10					16				
		Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mAmps)	Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mAmps)	Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mAmps)
				20°C	-10°C				20°C	-10°C				20°C	-10°C	
100	—	—	—	—	—	5×11.5	E3	0.65	1.3	181	—	—	—	—	—	
220	—	—	—	—	—	6.3×11.5	F3	0.32	0.64	290	—	—	—	—	—	
330	6.3×11.5	F3	0.32	0.64	290	8×12	G3	0.17	0.34	555	8×12	G3	0.17	0.34	555	
470	8×12	G3	0.17	0.34	555	8×12	G3	0.17	0.34	555	10×12.5	H3	0.12	0.24	760	
680	8×12	G3	0.17	0.34	555	10×12.5	H3	0.12	0.24	760	10×16	H4	0.080	0.16	1050	
1000	10×12.5	H3	0.12	0.24	760	10×16	H4	0.080	0.16	1050	10×20	H5	0.062	0.124	1220	
2200	10×25	H6	0.052	0.104	1440	12.5×20	I5	0.042	0.084	1690	12.5×25	I6	0.034	0.068	1950	
3300	12.5×20	I5	0.042	0.084	1690	12.5×25	I6	0.034	0.068	1950	16×25	J6	0.028	0.056	2560	
4700	12.5×30	I7	0.030	0.060	2310	16×25	J6	0.028	0.056	2560	16×31.5	J7	0.025	0.050	3010	
6800	16×25	J6	0.028	0.056	2560	16×31.5	J7	0.025	0.050	3010	—	—	—	—	—	
10000	16×31.5	J7	0.025	0.050	3010	—	—	—	—	—	—	—	—	—	—	

Rated voltage (V) Rated capacitance (μF)	Item	25					35					50				
		Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mAmps)	Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mAmps)	Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mAmps)
				20°C	-10°C				20°C	-10°C				20°C	-10°C	
22	—	—	—	—	—	—	—	—	—	—	5×11.5	E3	0.95	1.9	170	
33	—	—	—	—	—	5×11.5	E3	0.65	1.3	181	6.3×11.5	F3	0.46	0.92	260	
47	5×11.5	E3	0.65	1.3	181	6.3×11.5	F3	0.32	0.64	290	6.3×11.5	F3	0.46	0.92	260	
100	6.3×11.5	F3	0.32	0.64	290	8×12	G3	0.17	0.34	555	8×12	G3	0.21	0.42	485	
150	—	—	—	—	—	—	—	—	—	—	10×12.5	H3	0.19	0.38	615	
220	8×12	G3	0.17	0.34	555	10×12.5	H3	0.12	0.24	760	10×16	H4	0.16	0.32	850	
330	10×12.5	H3	0.12	0.24	760	10×16	H4	0.080	0.16	1050	10×20	H5	0.085	0.17	1050	
470	10×16	H4	0.080	0.16	1050	10×20	H5	0.062	0.124	1220	12.5×20	I5	0.060	0.12	1500	
680	10×20	H5	0.062	0.124	1220	12.5×20	I5	0.042	0.084	1690	12.5×25	I6	0.045	0.090	1832	
1000	12.5×20	I5	0.042	0.084	1690	12.5×25	I6	0.034	0.068	1950	16×25	J6	0.038	0.076	2240	
2200	16×25	J6	0.028	0.056	2560	16×31.5	J7	0.025	0.050	3010	—	—	—	—	—	
3300	16×31.5	J7	0.025	0.050	3010	—	—	—	—	—	—	—	—	—	—	

Rated voltage (V) Rated capacitance (μF)	Item	63					100				
		Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mAmps)	Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mAmps)
				20°C	-10°C				20°C	-10°C	
3.3	—	—	—	—	—	5×11.5	E3	1.9	7.6	57	
4.7	5×11.5	E3	1.2	3.6	120	5×11.5	E3	1.9	7.6	57	
10	5×11.5	E3	1.2	3.6	120	6.3×11.5	F3	1.1	4.4	78	
22	6.3×11.5	F3	0.55	1.7	148	8×12	G3	0.53	2.1	275	
33	6.3×11.5	F3	0.55	1.7	148	10×12.5	H3	0.47	1.9	319	
47	8×12	G3	0.32	0.96	360	10×16	H4	0.32	1.3	424	
100	10×12.5	H3	0.23	0.69	448	12.5×20	I5	0.13	0.52	805	
220	10×20	H5	0.12	0.36	676	16×25	J6	0.081	0.32	1290	
330	12.5×20	I5	0.075	0.23	979	16×25	J6	0.081	0.32	1290	
470	12.5×25	I6	0.065	0.20	1180	16×31.5	J7	0.059	0.23	1630	
1000	16×31.5	J7	0.042	0.13	1890	—	—	—	—	—	

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

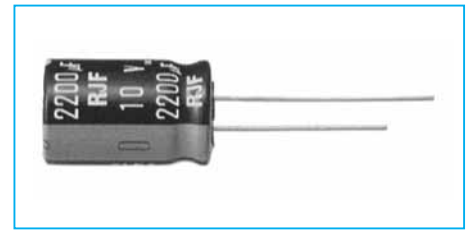
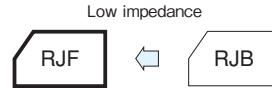
### NOTE

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

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.



Marking color : White print on a black sleeve

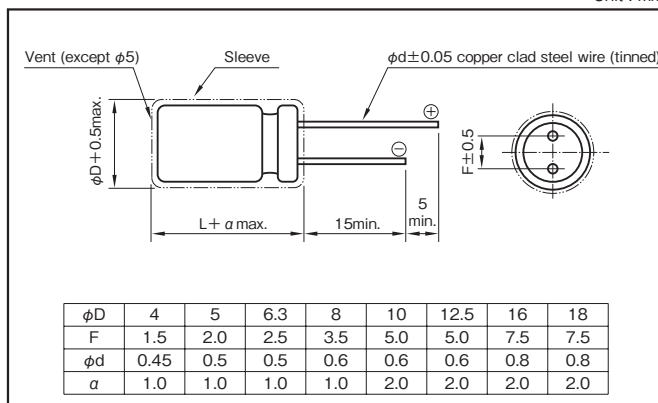
Specifications

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"> <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>80</th> <th>100</th> </tr> </thead> <tbody> <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>0.09</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	80	100	tanδ (max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.09	0.08												
Rated voltage (V)	6.3	10	16	25	35	50	63	80	100																								
tanδ (max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.09	0.08																								
Characteristics at high and low temperature	<table border="1"> <thead> <tr> <th colspan="2">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>80</th> <th>100</th> </tr> </thead> <tbody> <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> <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> <td>3</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	80	100	Impedance ratio (max.)	Z-25°C/Z+20°C	2	2	2	2	2	2	2	2	2	Z-40°C/Z+20°C	3	3	3	3	3	3	3	3	3
Rated voltage (V)		6.3	10	16	25	35	50	63	80	100																							
Impedance ratio (max.)	Z-25°C/Z+20°C	2	2	2	2	2	2	2	2	2																							
	Z-40°C/Z+20°C	3	3	3	3	3	3	3	3	3																							
Endurance (105°C) (Applied ripple current)	<table border="1"> <thead> <tr> <th>Test time</th> <th>5L &amp; 7L : φ5 &amp; φ6.3 : φ8 &amp; φ10 : φ12.5 to φ18 :</th> </tr> </thead> <tbody> <tr> <td></td> <td>1000 hours 2000 hours (63 to 100WV:5000 hours) 3000 hours (63 to 100WV:7000 hours) 5000 hours (63 to 100WV:10000 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 ±25% 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	5L & 7L : φ5 & φ6.3 : φ8 & φ10 : φ12.5 to φ18 :		1000 hours 2000 hours (63 to 100WV:5000 hours) 3000 hours (63 to 100WV:7000 hours) 5000 hours (63 to 100WV:10000 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																						
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Shelf life (105°C)	<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 ±25% 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> <p>Voltage application treatment</p>	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																								
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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)																																

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
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 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 voltage (V)	Item	6.3					10					16				
		Case	Casing symbol	Impedance (Ω)		Rated ripple current (mAmps)	Case	Casing symbol	Impedance (Ω)		Rated ripple current (mAmps)	Case	Casing symbol	Impedance (Ω)		Rated ripple current (mAmps)
				20°C	-10°C				20°C	-10°C				20°C	-10°C	
18	—	—	—	—	—	—	—	—	—	—	4×7	D1	0.92	2.8	130	
27	—	—	—	—	—	4×7	D1	0.89	2.7	130	6.3×5	F0	0.30	0.95	210	
33	—	—	—	—	—	—	—	—	—	—	5×7	E1	0.45	1.4	210	
39	4×7	D1	0.85	2.6	130	—	—	—	—	—	6.3×5	F0	0.30	0.95	210	
47	—	—	—	—	—	6.3×5	F0	0.29	0.93	210	—	—	—	—	—	
56	—	—	—	—	—	5×7	E1	0.44	1.4	210	5×11.5	E3	0.22	0.80	345	
68	5×7	E1	0.43	1.3	210	—	—	—	—	—	6.3×7	F1	0.24	0.72	300	
100	6.3×5	F0	0.28	0.91	210	5×11.5	E3	0.22	0.8	345	—	—	—	—	—	
120	—	—	—	—	—	6.3×7	F1	0.23	0.69	300	8×7	G1	0.15	0.45	380	
150	5×11.5	E3	0.22	0.80	345	—	—	—	—	—	6.3×11.5	F3	0.094	0.35	540	
180	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
220	8×7	G1	0.15	0.45	380	6.3×11.5	F3	0.094	0.35	540	—	—	—	—	—	
330	6.3×11.5	F3	0.094	0.35	540	—	—	—	—	—	8×12	G3	0.056	0.19	945	
470	—	—	—	—	—	8×12	G3	0.056	0.19	945	8×15	G4	0.045	0.15	1250	
560	8×12	G3	0.056	0.19	945	—	—	—	—	—	10×16	H4	0.028	0.10	1760	
680	—	—	—	—	—	10×12.5	H3	0.039	0.14	1330	—	—	—	—	—	
820	8×15	G4	0.046	0.15	1250	—	—	—	—	—	—	—	—	—	—	
1000	10×12.5	H3	0.039	0.14	1330	10×16	H4	0.028	0.10	1760	10×20	H5	0.020	0.060	1960	
1200	10×16	H4	0.028	0.10	1760	10×20	H5	0.020	0.060	1960	10×25	H6	0.018	0.054	2250	
1500	10×20	H5	0.020	0.060	1960	10×25	H6	0.018	0.054	2250	12.5×20	I5	0.017	0.043	2480	
2200	10×25	H6	0.018	0.054	2250	12.5×20	I5	0.017	0.043	2480	12.5×25	I6	0.015	0.038	2900	
2700	—	—	—	—	—	—	—	—	—	—	16×20	J5	0.015	0.038	3250	
3300	12.5×20	I5	0.017	0.043	2480	12.5×25	I6	0.015	0.038	2900	16×25	J6	0.013	0.035	3630	
3900	12.5×25	I6	0.015	0.038	2900	16×20	J5	0.015	0.038	3250	16×25	J6	0.013	0.035	3630	
4700	12.5×30	I7	0.013	0.033	3450	16×25	J6	0.013	0.035	3630	—	—	—	—	—	
5600	16×20	J5	0.015	0.038	3570	16×25	J6	0.013	0.035	3630	—	—	—	—	—	
6800	16×25	J6	0.013	0.035	3630	—	—	—	—	—	—	—	—	—	—	

Rated voltage (V)	Item	25					35					50				
		Case	Casing symbol	Impedance (Ω)		Rated ripple current (mAmps)	Case	Casing symbol	Impedance (Ω)		Rated ripple current (mAmps)	Case	Casing symbol	Impedance (Ω)		Rated ripple current (mAmps)
				20°C	-10°C				20°C	-10°C				20°C	-10°C	
5.6	—	—	—	—	—	—	—	—	—	—	4×7	D1	1.0	3.0	130	
10	5×5	E0	0.61	1.5	130	5×5	E0	0.63	1.5	130	5×7	E1	0.50	1.5	210	
15	4×7	D1	0.94	2.9	130	4×7	D1	0.96	2.9	130	—	—	—	—	—	
18	—	—	—	—	—	5×7	E1	0.47	1.5	210	—	—	—	—	—	
22	6.3×5	F0	0.31	0.97	210	6.3×5	F0	0.32	1.0	210	6.3×7	F1	0.26	0.78	300	
27	5×7	E1	0.46	1.4	210	—	—	—	—	—	5×11.5	E3	0.34	1.18	238	
33	—	—	—	—	—	5×11.5	E3	0.22	0.80	345	8×7	G1	0.17	0.51	380	
39	—	—	—	—	—	6.3×7	F1	0.25	0.75	300	—	—	—	—	—	
47	5×11.5	E3	0.22	0.80	345	—	—	—	—	—	—	—	—	—	—	
56	6.3×7	F1	0.24	0.72	300	8×7	G1	0.16	0.48	380	6.3×11.5	F3	0.14	0.50	385	
100	8×7	G1	0.15	0.45	380	6.3×11.5	F3	0.094	0.35	540	—	—	—	—	—	
120	6.3×11.5	F3	0.13	0.41	405	—	—	—	—	—	8×12	G3	0.074	0.22	724	
150	—	—	—	—	—	—	—	—	—	—	8×15	G4	0.061	0.18	950	
180	—	—	—	—	—	8×12	G3	0.056	0.19	945	10×12.5	H3	0.061	0.18	979	
220	8×12	G3	0.056	0.19	945	10×12.5	H3	0.039	0.14	1330	10×16	H4	0.042	0.12	1370	
270	—	—	—	—	—	8×20	G5	0.029	0.11	1500	10×20	H5	0.030	0.090	1580	
330	10×12.5	H3	0.039	0.14	1330	10×16	H4	0.028	0.10	1760	10×25	H6	0.028	0.085	1870	
470	10×16	H4	0.028	0.10	1760	10×20	H5	0.020	0.060	1960	12.5×20	I5	0.027	0.068	2050	
560	—	—	—	—	—	10×25	H6	0.018	0.054	2250	12.5×25	I6	0.023	0.059	2410	
680	10×20	H5	0.020	0.060	1960	12.5×20	I5	0.017	0.043	2480	16×20	J5	0.023	0.059	2730	
820	10×25	H6	0.018	0.054	2250	—	—	—	—	—	16×20	J5	0.023	0.059	2730	
1000	12.5×20	I5	0.017	0.043	2480	12.5×25	I6	0.015	0.038	2900	16×25	J6	0.021	0.056	3010	
1200	—	—	—	—	—	16×20	J5	0.015	0.038	3250	—	—	—	—	—	
1500	12.5×25	I6	0.015	0.038	2900	16×25	J6	0.013	0.035	3630	—	—	—	—	—	
1800	16×20	J5	0.015	0.038	3250	16×25	J6	0.013	0.035	3630	—	—	—	—	—	
2200	16×25	J6	0.013	0.035	3630	—	—	—	—	—	—	—	—	—	—	
2700	16×25	J6	0.013	0.035	3630	—	—	—	—	—	—	—	—	—	—	

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

#### NOTE

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Standard Ratings

Rated voltage (V) Rated capacitance (μF)	Item	63					80					100							
		Case		Casing symbol	Impedance (Ω)		Rated ripple current (mA rms)	Case		Casing symbol	Impedance (Ω)		Rated ripple current (mA rms)	Case		Casing symbol	Impedance (Ω)		Rated ripple current (mA rms)
		φD	L		20°C	-10°C		φD	L		20°C	-10°C		φD	L		20°C	-10°C	
6.8		-	-	-	-	-	-	-	-	-	-	-	5	11.5	E3	1.40	5.60	125	
15		5	11.5	E3	0.88	3.50	165	-	-	-	-	-	6.3	11.5	F3	0.57	2.30	205	
27		-	-	-	-	-	-	-	-	-	-	-	8	12	G3	0.36	1.40	335	
33		6.3	11.5	F3	0.35	1.40	265	-	-	-	-	-	-	-	-	-	-	-	
39		-	-	-	-	-	-	-	-	-	-	-	8	15	G4	0.25	1.00	450	
47		-	-	-	-	-	-	-	-	-	-	-	10	12.5	H3	0.17	0.66	480	
56		8	12	G3	0.22	0.88	500	-	-	-	-	-	8	20	G5	0.19	0.76	565	
68		-	-	-	-	-	-	10	12.5	H3	0.17	0.66	480	10	16	H4	0.11	0.47	600
82		10	12.5	H3	0.11	0.44	690	-	-	-	-	-	10	20	H5	0.084	0.34	800	
100		-	-	-	-	-	-	10	16	H4	0.11	0.47	600	12	15	I4	0.11	0.34	750
120		8	20	G5	0.12	0.48	820	10	20	H5	0.084	0.34	800	10	25	H6	0.069	0.028	900
		10	16	H4	0.076	0.31	950	-	-	-	-	-	-	-	-	-	-	-	
150		-	-	-	-	-	-	10	25	H6	0.069	0.028	900	12.5	20	I5	0.062	0.018	1100
180		10	20	H5	0.056	0.23	1150	-	-	-	-	-	-	-	-	-	-	-	
220		10	25	H6	0.046	0.19	1350	12.5	20	I5	0.062	0.18	1100	16	20	J5	0.048	0.15	1350
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
270		12.5	20	I5	0.041	0.13	1500	-	-	-	-	-	12.5	30	I7	0.042	0.13	1500	
330		-	-	-	-	-	-	12.5	25	I6	0.047	0.14	1250	12.5	35	I8	0.036	0.11	1650
		-	-	-	-	-	-	16	20	J5	0.048	0.15	1350	16	25	J6	0.038	0.12	1700
		-	-	-	-	-	-	-	-	-	-	-	18	20	K5	0.045	0.14	1500	
390		12.5	25	I6	0.031	0.93	1900	12.5	30	I7	0.042	0.13	1500	12.5	40	I9	0.032	0.095	1800
470		12.5	30	I7	0.028	0.84	2300	12.5	35	I8	0.036	0.11	1650	16	31.5	J7	0.032	0.095	1850
		16	20	J5	0.032	0.096	2000	16	25	J6	0.038	0.12	1700	18	25	K6	0.036	0.11	1750
		-	-	-	-	-	-	18	20	K5	0.045	0.14	1500	-	-	-	-	-	-
560		12.5	35	I8	0.024	0.07	2500	-	-	-	-	-	16	35.5	J8	0.029	0.086	2000	
		-	-	-	-	-	-	-	-	-	-	-	18	31.5	K7	0.030	0.090	1900	
680		12.5	40	I9	0.021	0.063	2800	16	31.5	J7	0.032	0.095	1850	16	40	J9	0.027	0.081	2480
		16	25	J6	0.025	0.075	2600	-	-	-	-	-	18	35.5	K8	0.027	0.081	2200	
		18	20	K5	0.030	0.090	2500	-	-	-	-	-	-	-	-	-	-	-	
820		16	31.5	J7	0.021	0.063	2850	16	35.5	J8	0.029	0.086	2000	18	40	K9	0.026	0.077	2700
		18	25	K6	0.024	0.072	2800	18	31.5	K7	0.030	0.090	1900	-	-	-	-	-	-
1000		16	35.5	J8	0.019	0.057	2900	-	-	-	-	-	-	-	-	-	-	-	
1200		16	40	J9	0.018	0.054	3400	18	40	K9	0.026	0.077	2700	-	-	-	-	-	-
		18	31.5	K7	0.020	0.060	3300	-	-	-	-	-	-	-	-	-	-	-	
1500		18	35.5	K8	0.018	0.054	3400	-	-	-	-	-	-	-	-	-	-	-	
1800		18	40	K9	0.017	0.051	3500	-	-	-	-	-	-	-	-	-	-	-	

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

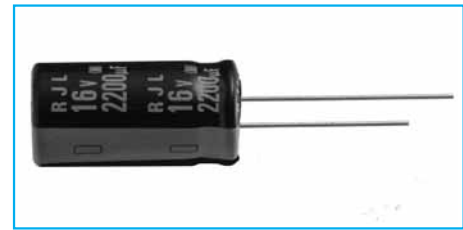
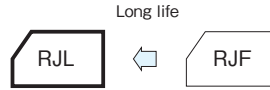
NOTE

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

## 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.



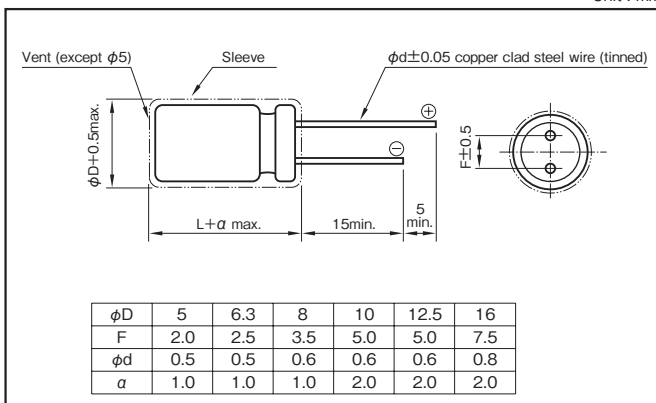
Marking color : White print on a black sleeve

### 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)	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	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 3 3 (120Hz)									
Endurance (105°C) (Applied ripple current)	Test time	φ5, φ6.3 : 5000 hours (6.3~10WV : 4000 hours) φ8, φ10 : 7000 hours (6.3~10WV : 6000 hours) φ12.5, φ16 : 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)								

### Outline Drawing

Unit : mm



### Coefficient of Frequency for Rated Ripple Current

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

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

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.

### NOTE

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

Standard Ratings

Rated voltage (V) Rated capacitance (μF)	Item	6.3					10					16				
		Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)
				20°C	-10°C				20°C	-10°C				20°C	-10°C	
56	—	—	—	—	—	—	—	—	—	—	5×11.5	E3	0.58	2.3	210	
100	—	—	—	—	—	5×11.5	E3	0.58	2.3	210	—	—	—	—	—	
120	—	—	—	—	—	—	—	—	—	—	6.3×11.5	F3	0.22	0.87	340	
150	5×11.5	E3	0.58	2.3	210	—	—	—	—	—	—	—	—	—	—	
220	—	—	—	—	—	6.3×11.5	F3	0.22	0.87	340	—	—	—	—	—	
330	6.3×11.5	F3	0.22	0.87	340	—	—	—	—	—	8×12	G3	0.13	0.52	640	
470	—	—	—	—	—	8×12	G3	0.13	0.52	640	8×15	G4	0.087	0.35	840	
560	8×12	G3	0.13	0.52	640	8×15	G4	0.087	0.35	840	—	—	—	—	—	
680	8×12	G3	0.13	0.52	640	10×12.5	H3	0.080	0.32	865	10×16	H4	0.060	0.24	1210	
820	10×12.5	H3	0.080	0.32	865	10×16	H4	0.060	0.24	1210	10×20	H5	0.046	0.18	1400	
1000	8×15	G4	0.087	0.35	840	10×16	H4	0.060	0.24	1210	10×20	H5	0.046	0.18	1400	
1200	10×16	H4	0.060	0.24	1210	10×20	H5	0.046	0.18	1400	10×25	H6	0.042	0.17	1650	
1500	10×20	H5	0.046	0.18	1400	10×25	H6	0.042	0.17	1650	12.5×20	I5	0.035	0.12	1900	
1800	10×25	H6	0.042	0.17	1650	12.5×20	I5	0.035	0.12	1900	12.5×25	I6	0.027	0.089	2230	
2200	10×25	H6	0.042	0.17	1650	12.5×20	I5	0.035	0.12	1900	12.5×25	I6	0.027	0.089	2230	
2700	—	—	—	—	—	—	—	—	—	—	16×20	J5	0.027	0.078	2530	
3300	12.5×20	I5	0.035	0.12	1900	12.5×25	I6	0.027	0.089	2230	12.5×35	I8	0.020	0.065	2880	
3900	—	—	—	—	—	—	—	—	—	—	16×25	J6	0.021	0.060	2930	
4700	12.5×30	I7	0.024	0.078	2650	12.5×35	I8	0.020	0.065	2880	—	—	—	—	—	
5600	16×20	J5	0.027	0.078	2530	16×25	J6	0.021	0.060	2930	—	—	—	—	—	
6800	16×25	J6	0.021	0.060	2930	—	—	—	—	—	—	—	—	—	—	

Rated voltage (V) Rated capacitance (μF)	Item	25					35					50				
		Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)
				20°C	-10°C				20°C	-10°C				20°C	-10°C	
10	—	—	—	—	—	—	—	—	—	—	5×11.5	E3	1.50	6.0	100	
22	—	—	—	—	—	—	—	—	—	—	5×11.5	E3	0.70	2.8	180	
33	—	—	—	—	—	5×11.5	E3	0.58	2.3	210	—	—	—	—	—	
47	5×11.5	E3	0.58	2.3	210	—	—	—	—	—	—	—	—	—	—	
56	—	—	—	—	—	6.3×11.5	F3	0.22	0.87	340	6.3×11.5	F3	0.30	1.2	295	
100	6.3×11.5	F3	0.22	0.87	340	—	—	—	—	—	8×12	G3	0.17	0.68	555	
120	—	—	—	—	—	—	—	—	—	—	8×15	G4	0.12	0.48	730	
150	—	—	—	—	—	8×12	G3	0.13	0.52	640	10×12.5	H3	0.12	0.48	760	
180	—	—	—	—	—	8×15	G4	0.087	0.35	870	8×20	G5	0.091	0.36	910	
220	8×12	G3	0.13	0.52	640	8×15	G4	0.087	0.35	870	10×16	H4	0.084	0.34	1050	
270	—	—	—	—	—	8×20	G5	0.069	0.27	1050	10×20	H5	0.060	0.24	1220	
330	8×15	G4	0.087	0.35	840	10×16	H4	0.060	0.24	1210	10×25	H6	0.055	0.22	1440	
470	10×16	H4	0.060	0.24	1210	10×20	H5	0.046	0.18	1400	12.5×20	I5	0.045	0.15	1660	
560	—	—	—	—	—	10×25	H6	0.042	0.17	1650	12.5×25	I6	0.034	0.11	1950	
680	10×20	H5	0.046	0.18	1400	12.5×20	I5	0.035	0.12	1900	12.5×25	I6	0.028	0.085	1870	
820	10×25	H6	0.042	0.17	1650	12.5×25	I6	0.027	0.089	2230	12.5×30	I7	0.030	0.10	2310	
1000	12.5×20	I5	0.035	0.12	1900	12.5×25	I6	0.027	0.089	2230	16×25	J6	0.025	0.075	2555	
1200	12.5×25	I6	0.027	0.089	2230	16×20	J5	0.027	0.078	2530	—	—	—	—	—	
1500	12.5×25	I6	0.027	0.089	2230	12.5×35	I8	0.020	0.065	2880	—	—	—	—	—	
1800	16×20	J5	0.027	0.078	2530	16×25	J6	0.021	0.060	2930	—	—	—	—	—	
2200	12.5×35	I8	0.020	0.065	2880	—	—	—	—	—	—	—	—	—	—	
2700	16×25	J6	0.021	0.060	2930	—	—	—	—	—	—	—	—	—	—	

Rated voltage (V) Rated capacitance (μF)	Item	63					100				
		Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)	Case φD×L (mm)	Casing symbol	Impedance (Ω)		Rated ripple current (mArms)
				20°C	-10°C				20°C	-10°C	
6.8	—	—	—	—	—	5×11.5	E3	2.3	9.3	55	
15	5×11.5	E3	2.3	9.3	55	6.3×11.5	F3	1.2	5.0	115	
27	6.3×11.5	F3	1.2	5.0	115	8×12	G3	0.63	2.8	232	
47	—	—	—	—	—	10×12.5	H3	0.43	1.8	288	
56	8×12	G3	0.63	2.8	232	8×20	G5	0.33	1.6	362	
68	—	—	—	—	—	10×16	H4	0.31	1.5	357	
82	8×15	G4	0.45	2.1	300	10×20	H5	0.21	0.94	466	
100	—	—	—	—	—	10×25	H6	0.20	0.84	531	
120	10×16	H4	0.31	1.5	357	12.5×20	I5	0.16	0.64	690	
180	10×20	H5	0.21	0.94	466	12.5×25	I6	0.120	0.45	784	
220	10×25	H6	0.20	0.84	531	16×20	J5	0.091	0.38	1040	
270	12.5×20	I5	0.16	0.64	690	16×25	J6	0.073	0.27	1250	
330	12.5×25	I6	0.12	0.45	784	—	—	—	—	—	
390	16×20	J5	0.091	0.38	1040	—	—	—	—	—	
470	16×20	J5	0.091	0.38	1040	—	—	—	—	—	
560	16×25	J6	0.073	0.27	1250	—	—	—	—	—	

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

Miniature Aluminum Electrolytic Capacitors

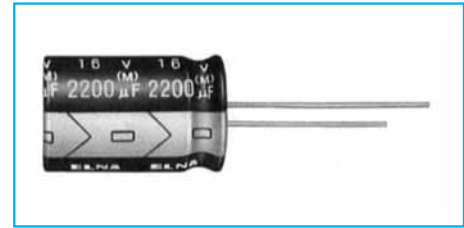
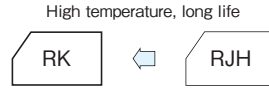
NOTE

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

## 125°C Use, Long Life Capacitors

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

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



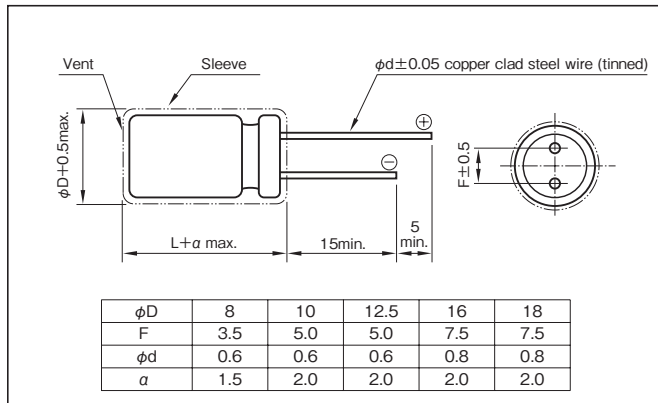
Marking color : White print on a black sleeve

### 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"> <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"> <tr> <th>Impedance ratio (max.)</th> <td>Z-40°C/Z+20°C</td> <td>3 or less</td> </tr> </table> (120Hz)	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 ( $\phi 10$ : 3000 hours, $\phi 8$ : 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)														

### 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 : 10V1000μF)

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.

### NOTE

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

Standard Ratings

Rated voltage (V) Rated capacitance (μF)	Item	10				16				25			
		Case φD×L (mm)	Casing symbol	Impedance (Ω)	Rated ripple current (mA <sub>rms</sub> )	Case φD×L (mm)	Casing symbol	Impedance (Ω)	Rated ripple current (mA <sub>rms</sub> )	Case φD×L (mm)	Casing symbol	Impedance (Ω)	Rated ripple current (mA <sub>rms</sub> )
220	—	—	—	—	—	8×12	G3	0.26	340	8×15	G4	0.19	480
330	8×12	G3	0.26	340	10×12.5	H3	0.20	500	10×16	H4	0.15	630	
470	10×12.5	H3	0.20	500	10×16	H4	0.15	630	10×20	H5	0.10	770	
1000	10×20	H5	0.10	770	12.5×20	I5	0.070	920	12.5×25	I6	0.050	1250	
2200	12.5×25	I6	0.050	1250	16×25	J6	0.042	1380	16×25	J6	0.042	1380	
3300	16×25	J6	0.042	1380	18×25	K6	0.041	1450	18×31.5	K7	0.035	1720	
4700	18×25	K6	0.041	1450	18×35.5	K8	0.029	1980	18×35.5	K8	0.029	1980	
10000	18×35.5	K8	0.029	1980	—	—	—	—	—	—	—	—	—

Rated voltage (V) Rated capacitance (μF)	Item	35				50				63			
		Case φD×L (mm)	Casing symbol	Impedance (Ω)	Rated ripple current (mA <sub>rms</sub> )	Case φD×L (mm)	Casing symbol	Impedance (Ω)	Rated ripple current (mA <sub>rms</sub> )	Case φD×L (mm)	Casing symbol	Impedance (Ω)	Rated ripple current (mA <sub>rms</sub> )
47	—	—	—	—	—	—	—	—	—	8×12	G3	0.68	245
100	8×12	G3	0.26	340	10×12.5	H3	0.36	415	10×16	H4	0.30	455	
220	10×16	H4	0.15	630	10×20	H5	0.18	655	12.5×20	I5	0.18	665	
330	10×20	H5	0.10	770	12.5×20	I5	0.12	780	12.5×25	I6	0.14	995	
470	12.5×20	I5	0.070	920	12.5×25	I6	0.090	1060	16×25	J6	0.10	1000	
1000	16×25	J6	0.042	1380	16×25	J6	0.078	1130	18×31.5	K7	0.084	1280	
2200	18×31.5	K7	0.035	1720	18×35.5	K8	0.051	1720	—	—	—	—	
3300	18×40	K9	0.025	2240	—	—	—	—	—	—	—	—	

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

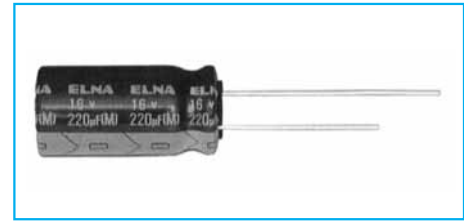
NOTE

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

## Low Leakage Current Capacitors

GREEN  
CAP

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

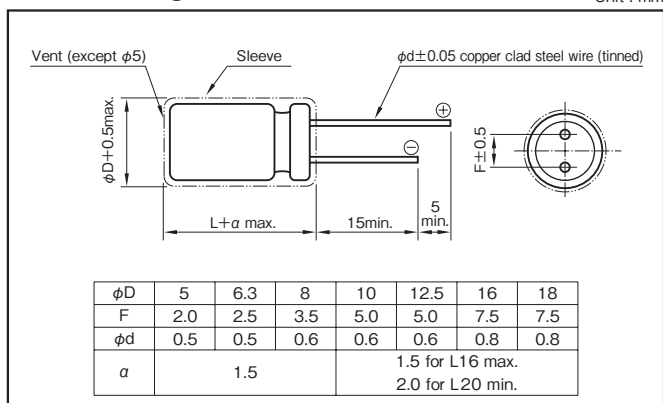


Marking color : White print on a blue sleeve

### 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					
		1μF or less					
Characteristics at high and low temperature	Rated voltage (V)						
	Impedance ratio (max.)	Z-25°C/Z+20°C					
		Z-40°C/Z+20°C					
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 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



### Coefficient of Frequency for Rated Ripple Current

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

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

RLB	—	10	V	102	M	I6	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	

### Casing symbol

Case φD×L (mm)	Casing symbol	Case φD×L (mm)	Casing symbol	Case φD×L (mm)	Casing symbol	Case φD×L (mm)	Casing symbol
5×11	E3	10×12.5	H3	12.5×20	I5	16×31.5	J7
6.3×11	F3	10×16	H4	12.5×25	I6	16×35.5	J8
8×11.5	G3	10×20	H5	16×25	J6	18×35.5	K8
						18×40	K9

### Standard Ratings

Rated voltage (V)	6.3		10		16		25		35		50	
	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms
0.47	—	—	—	—	—	—	—	—	—	—	5×11	14
1	—	—	—	—	—	—	—	—	—	—	5×11	20
2.2	—	—	—	—	—	—	—	—	—	—	5×11	26
3.3	—	—	—	—	—	—	—	—	—	—	5×11	32
4.7	—	—	—	—	—	—	5×11	34	5×11	34	6.3×11	43
10	—	—	—	—	5×11	543	6.3×11	57	6.3×11	57	8×11.5	75
22	—	—	5×11	56	6.3×11	74	8×11.5	99	8×11.5	99	10×12.5	131
33	—	—	6.3×11	79	6.3×11	90	8×11.5	121	10×12.5	144	10×16	176
47	—	—	6.3×11	94	8×11.5	127	10×12.5	172	10×12.5	172	10×16	210
100	—	—	8×11.5	160	10×12.5	220	10×16	270	10×20	300	12.5×20	380
220	10×12.5	260	10×16	350	10×20	390	12.5×20	510	12.5×25	550	16×25	720
330	10×16	350	10×20	460	12.5×20	550	12.5×25	680	16×25	790	16×31.5	970
470	10×20	460	12.5×20	570	12.5×25	650	16×25	940	16×25	940	16×35.5	1210
1000	12.5×25	840	12.5×25	910	16×25	1210	16×35.5	1580	18×35.5	1690	—	—
2200	16×25	1440	16×31.5	1710	18×35.5	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 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

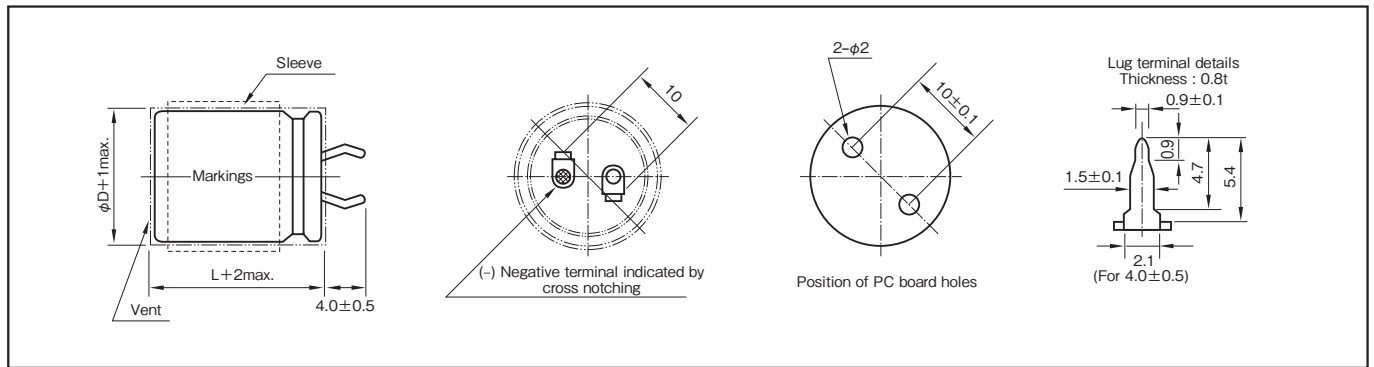
Specifications

Item	Performance							
Category temperature range (°C)	-40 to +85 (450V is at -25 to +85)							
Tolerance at rated capacitance (%)	±20 (20°C, 120Hz)							
Leakage current (µA)	Less than 0.01CV or 1.5mA whichever is smaller (after 5 minutes) C : Rated capacitance (µF) ; V : Rated voltage (V) (20°C)							
Tangent of loss angle	Rated voltage (V)		10	16	25	35	50	63 to 100
	tanδ (max.)		0.80	0.60	0.50	0.40	0.30	0.20
	tanδ (max.)	φD	Rated voltage (V)		160 to 250	315 to 450		
			22 to 30	0.10	0.15			
		35		0.15	0.15			
(20°C, 120Hz)								
Characteristics at high and low temperature	Rated voltage (V)		10	16 to 35	50 to 100	160 to 200	250 to 400	450
	Impedance ratio (max.)	Z-25°C/Z+20°C		5	4	3	3	4
Z-40°C/Z+20°C		18	15	10	6	8	—	
(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					
	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 : 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

NOTE

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

### Standard Ratings

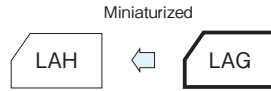
Case φD×L (mm)	Casing symbol	10			16			25			35			50			63			80			100					
		Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current	Rated capacitance	ESR	Rated ripple current			
22×20	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			
22×25	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			
22×30	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			
22×35	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			
22×40	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			
22×45	S26	27000	0.031	4.3	—	—	—	—	—	—	—	—	—	—	—	—	4700	0.053	3.7	3300	0.075	3.2	2200	0.113	3.2			
22×50	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	—	—	—			
25×20	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			
25×25	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			
25×30	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			
25×35	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			
25×40	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			
25×45	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	
25×50	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		
30×20	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			
30×25	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			
30×30	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			
30×35	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			
30×40	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			
30×45	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			
30×50	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
35×20	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			
35×25	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			
35×30	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	6800	0.037	4.8	4700	0.053	4.2	3300	0.075	4.3			
35×35	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	8200	0.030	5.5	5600	0.044	4.7	3900	0.064	4.8			
35×40	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			
35×45	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
35×50	S57	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15000	0.017	7.9	10000	0.025	6.8	—	—	—	—	—	

Case φD×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		
22×20	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		
22×25	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		
22×30	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		
22×35	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		
22×40	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		
22×45	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		
22×50	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
25×20	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		
25×25	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		
25×30	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		
25×35	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		
25×40	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		
25×45	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	—	—	—		
25×50	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		
30×20	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		
30×25	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		
30×30	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		
30×35	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		
30×40	S45	1500	0.111	3.7	—	—	—	1200	0.138	3.4	820	0.202	2.9	560	0.444	2.4	390	0.638	1.9	330	0.754	1.8	270	0.922	1.6		
30×45	S46	1800	0.092	4.2	1500	0.111	3.9	—	—	—	1000	0.166	3.3	680	0.366	2.7	470	0.529	2.1	390	0.638	2.0	—	—	—		
30×50	S47	2200	0.075	4.7	1800	0.092	4.3	1500	0																		

High-Reliability Standard Capacitors

GREEN CAP 105°C 2000hours

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



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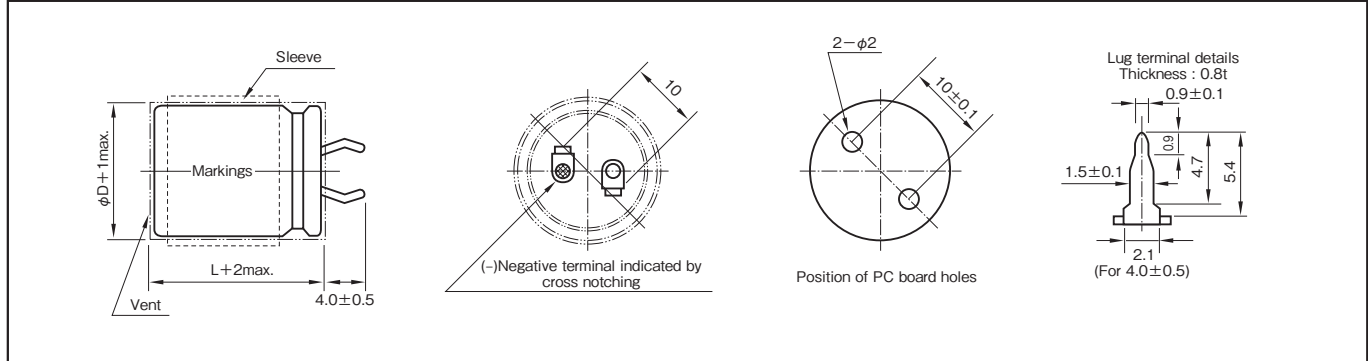
Specifications

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 φ35 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 : 200V470µF)

LAG	—	200	V	471	M	S34	#	B
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol		Additional 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.

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				250					
Case φD×L (mm)	Casing symbol	Item		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		
22×25	S22	270	0.614	460	1.16	220	0.754	460	1.08	180	0.922	460	1.08	120	2.073	460	0.94		
22×30	S23	330	0.503	420	1.43	270	0.614	420	1.30	270	0.614	420	1.30	180	1.382	420	1.10		
22×35	S24	390	0.425	380	1.52	390	0.425	380	1.50	330	0.503	380	1.41	220	1.131	380	1.13		
22×40	S25	470	0.353	340	1.62	470	0.353	340	1.62	390	0.425	340	1.50	270	0.922	340	1.20		
22×45	S26	—	—	—	—	560	0.296	320	1.69	470	0.353	320	1.58	330	0.754	320	1.26		
22×50	S27	680	0.244	290	1.81	—	—	—	—	560	0.296	290	1.68	390	0.638	290	1.37		
25×25	S32	390	0.425	460	1.55	270	0.614	460	1.35	270	0.614	460	1.35	180	1.382	460	1.15		
25×30	S33	470	0.353	360	1.73	390	0.425	360	1.62	330	0.503	360	1.47	220	1.131	360	1.30		
25×35	S34	560	0.296	330	1.81	470	0.353	330	1.69	470	0.353	330	1.65	330	0.754	330	1.41		
25×40	S35	680	0.244	290	1.98	560	0.296	290	1.72	560	0.296	290	1.80	390	0.638	290	1.52		
25×45	S36	820	0.202	270	2.04	680	0.244	270	1.78	—	—	—	—	470	0.529	270	1.59		
25×50	S37	—	—	—	—	820	0.202	230	1.91	680	0.244	270	1.78	—	—	—	—		
30×25	S42	560	0.296	310	1.82	390	0.425	310	1.67	390	0.425	310	1.56	220	1.131	310	1.30		
30×30	S43	680	0.244	280	1.98	560	0.296	280	1.74	560	0.296	280	1.82	330	0.754	280	1.36		
30×35	S44	820	0.202	240	2.14	680	0.244	240	1.85	680	0.244	240	1.99	470	0.529	240	1.57		
30×40	S45	1000	0.166	200	2.22	820	0.202	200	2.01	820	0.202	200	2.12	560	0.444	200	1.76		
30×45	S46	1200	0.138	170	2.46	1000	0.166	170	2.19	—	—	—	—	—	—	—	—		
30×50	S47	—	—	—	—	1200	0.138	150	2.36	1000	0.166	150	2.22	820	0.303	150	1.87		
35×30	S53	820	0.303	180	2.40	820	0.303	180	2.16	680	0.366	180	2.07	470	0.529	180	1.56		
35×35	S54	1000	0.249	150	2.53	1000	0.249	150	2.34	820	0.303	150	2.22	680	0.366	150	1.82		
35×40	S55	1500	0.166	120	2.97	1200	0.207	120	2.56	1000	0.249	120	2.42	820	0.303	120	1.98		
35×45	S56	—	—	—	—	—	—	—	—	—	—	—	—	1000	0.249	90	2.10		
35×50	S57	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 φD×L (mm)	Casing symbol	Item		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		
22×25	S22	82	3.034	850	0.56	68	3.659	850	0.56	68	3.659	850	0.56	56	4.443	850	0.47		
22×30	S23	120	2.073	800	0.70	100	2.488	800	0.70	82	3.034	800	0.63	68	3.659	800	0.56		
22×35	S24	150	1.659	740	0.78	120	2.073	740	0.73	120	2.073	740	0.73	100	2.488	740	0.64		
22×40	S25	180	1.382	700	0.89	150	1.659	700	0.79	150	1.659	700	0.79	120	2.073	700	0.70		
22×45	S26	—	—	—	—	180	1.382	640	0.81	—	—	—	—	—	—	—	—		
22×50	S27	220	1.131	600	0.93	220	1.131	600	0.93	180	1.382	600	0.84	150	1.659	600	0.78		
25×25	S32	120	2.073	800	0.70	100	2.488	800	0.70	100	2.488	800	0.70	—	—	—	—		
25×30	S33	150	1.659	720	0.82	150	1.659	720	0.82	120	2.073	720	0.73	100	2.488	720	0.70		
25×35	S34	180	1.382	660	0.89	180	1.382	660	0.89	150	1.659	660	0.81	120	2.073	660	0.73		
25×40	S35	220	1.131	600	0.97	220	1.131	600	0.97	180	1.382	600	0.88	150	1.659	600	0.82		
25×45	S36	270	0.922	560	1.00	—	—	—	—	220	1.131	560	0.91	180	1.382	560	0.87		
25×50	S37	330	0.754	500	1.16	270	0.922	500	1.01	270	0.922	500	1.01	220	1.131	500	0.94		
30×25	S42	150	1.659	640	0.82	150	1.659	640	0.82	150	1.659	640	0.82	—	—	—	—		
30×30	S43	220	1.131	580	1.01	180	1.382	580	0.90	180	1.382	580	0.90	150	1.659	580	0.83		
30×35	S44	270	0.922	520	1.05	270	0.922	520	1.05	220	1.131	520	0.95	180	1.382	520	0.86		
30×40	S45	330	0.754	440	1.21	—	—	—	—	270	0.922	440	1.09	220	1.131	440	0.95		
30×45	S46	390	0.638	380	1.26	330	0.754	380	1.16	330	0.754	380	1.16	270	0.922	380	1.11		
30×50	S47	470	0.529	340	1.32	390	0.638	340	1.26	390	0.638	340	1.26	—	—	—	—		
35×30	S53	270	0.922	420	1.01	270	0.922	420	1.01	270	0.922	420	1.01	180	1.382	420	0.91		
35×35	S54	390	0.638	340	1.26	330	0.754	340	1.16	330	0.754	340	1.16	270	0.922	340	1.13		
35×40	S55	470	0.529	280	1.32	390	0.638	280	1.26	390	0.638	280	1.26	330	0.754	280	1.26		
35×45	S56	—	—	—	—	470	0.529	260	1.35	470	0.529	260	1.35	—	—	—	—		
35×50	S57	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

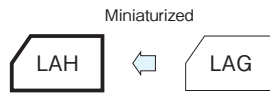
**NOTE**

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

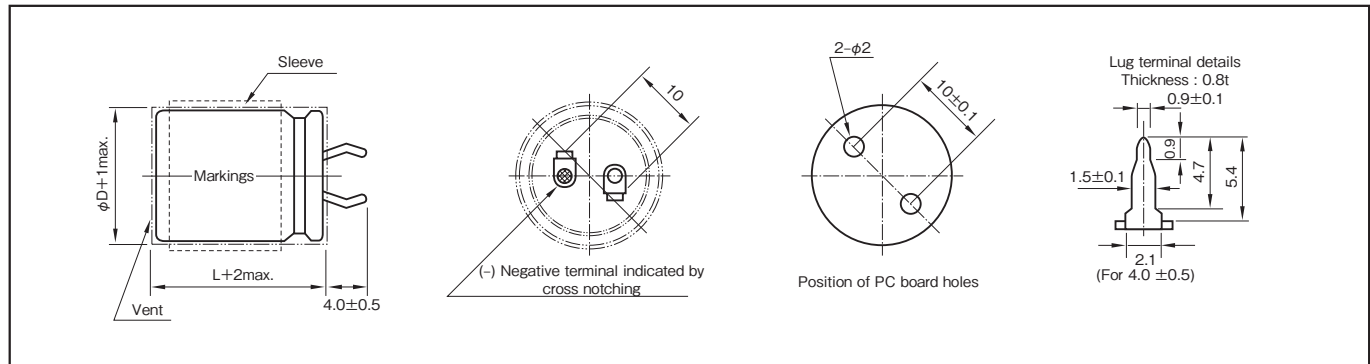
Specifications

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)	<table border="1"> <tr> <th>Rated voltage (V)</th> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63 to 100</td> <td>160 to 250</td> <td>400 to 450</td> </tr> <tr> <th>tanδ (max.)</th> <td>0.50</td> <td>0.40</td> <td>0.35</td> <td>0.30</td> <td>0.20</td> <td>0.15</td> <td>0.20</td> </tr> </table> (20°C, 120Hz)		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
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	<table border="1"> <tr> <th>Rated voltage (V)</th> <td>16 to 100</td> <td>160 to 200</td> <td>250 to 400</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>—</td> </tr> </table> (120Hz)		Rated voltage (V)	16 to 100	160 to 200	250 to 400	Impedance ratio (max.)	Z-25°C/Z+20°C	4	4	Z-40°C/Z+20°C	15	—					
Rated voltage (V)	16 to 100	160 to 200	250 to 400															
Impedance ratio (max.)	Z-25°C/Z+20°C	4	4															
	Z-40°C/Z+20°C	15	—															
Endurance (105°C) (Applied ripple current)	<table border="1"> <tr> <th>Test time</th> <td>2000 hours</td> </tr> <tr> <th>Leakage current</th> <td>The initial specified value or less</td> </tr> <tr> <th>Percentage of capacitance change</th> <td>Within ±20% of initial value</td> </tr> <tr> <th>Tangent of the loss angle</th> <td>200% or less of the initial specified value</td> </tr> </table>		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								
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)	<table border="1"> <tr> <th>Test time</th> <td>1000 hours</td> </tr> <tr> <th>Leakage current</th> <td>The initial specified value or less</td> </tr> <tr> <th>Percentage of capacitance change</th> <td>Within ±15% of initial value</td> </tr> <tr> <th>Tangent of the loss angle</th> <td>150% or less of the initial specified value</td> </tr> </table> Voltage application treatment		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																	
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)

LAH	—	200	V	471	M	S33	#	B
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol		Additional 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.

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		
Case φD×L (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
22×25	S22	6800	0.122	1.60	4700	0.141	1.55	3300	0.176	1.43	1800	0.184	1.31
22×30	S23	10000	0.083	1.99	6800	0.098	1.91	3900	0.149	1.65	2700	0.123	1.70
22×35	S24	12000	0.069	2.28	8200	0.081	2.14	5600	0.104	2.02	3300	0.101	1.98
22×40	S25	15000	0.055	2.64	10000	0.066	2.40	6800	0.085	2.28	3900	0.085	2.25
22×45	S26	18000	0.046	2.98	12000	0.055	2.69	—	—	—	4700	0.071	2.56
22×50	S27	—	—	—	—	—	—	8200	0.071	2.67	5600	0.059	2.89
25×25	S32	10000	0.083	1.99	6800	0.098	1.91	4700	0.124	1.78	2700	0.123	1.70
25×30	S33	12000	0.069	2.30	8200	0.081	2.16	5600	0.104	2.04	3300	0.101	2.00
25×35	S34	15000	0.055	2.68	10000	0.066	2.44	6800	0.085	2.31	3900	0.085	2.28
25×40	S35	18000	0.046	3.04	12000	0.055	2.74	8200	0.071	2.60	5600	0.059	2.81
25×45	S36	22000	0.038	3.40	15000	0.044	3.15	10000	0.058	2.92	—	—	—
25×50	S37	27000	0.031	3.81	18000	0.037	3.54	12000	0.048	3.26	6800	0.049	3.37
30×25	S42	12000	0.069	2.38	8200	0.081	2.25	5600	0.104	2.12	3900	0.085	2.22
30×30	S43	18000	0.046	3.00	12000	0.055	2.70	8200	0.071	2.56	4700	0.071	2.58
30×35	S44	22000	0.038	3.39	15000	0.044	3.13	10000	0.058	2.92	5600	0.059	2.95
30×40	S45	27000	0.031	3.83	18000	0.037	3.54	12000	0.048	3.28	6800	0.049	3.39
30×45	S46	33000	0.025	4.30	22000	0.030	4.24	15000	0.039	3.74	8200	0.040	3.71
30×50	S47	39000	0.021	4.74	—	—	—	—	—	—	10000	0.033	4.09
35×25	S52	18000	0.046	3.10	12000	0.055	2.80	8200	0.071	2.78	4700	0.071	2.67
35×30	S53	27000	0.031	3.74	15000	0.044	3.22	12000	0.048	3.20	6800	0.049	3.31
35×35	S54	33000	0.025	4.24	22000	0.030	3.96	15000	0.039	3.69	8200	0.040	3.66
35×40	S55	39000	0.021	4.72	—	—	—	18000	0.032	4.16	10000	0.033	4.07
35×45	S56	47000	0.018	5.27	27000	0.025	4.75	—	—	—	12000	0.028	4.50
35×50	S57	—	—	—	33000	0.020	5.39	22000	0.026	4.92	—	—	—

Large Capacitance  
Aluminum Electrolytic Capacitors

Rated voltage (V)		63			80			100		
Case φD×L (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
22×25	S22	1200	0.207	1.25	820	0.303	1.11	560	0.444	1.07
22×30	S23	1800	0.138	1.52	1200	0.207	1.39	820	0.303	1.35
22×35	S24	2200	0.113	1.73	1500	0.166	1.61	1000	0.249	1.54
22×40	S25	2700	0.092	1.97	1800	0.138	1.83	1200	0.207	1.74
22×45	S26	—	—	—	2200	0.113	2.09	1500	0.166	1.99
22×50	S27	3300	0.075	2.32	—	—	—	—	—	—
25×25	S32	1800	0.138	1.52	1200	0.207	1.39	820	0.303	1.35
25×30	S33	2200	0.113	1.75	1500	0.166	1.62	1000	0.249	1.56
25×35	S34	2700	0.092	1.99	2200	0.113	2.01	1200	0.207	1.76
25×40	S35	3300	0.075	2.27	—	—	—	1500	0.166	2.03
25×45	S36	3900	0.064	2.54	2700	0.092	2.43	1800	0.138	2.28
25×50	S37	4700	0.053	2.88	3300	0.075	2.76	2200	0.113	2.57
30×25	S42	2700	0.092	1.93	1800	0.138	1.81	1200	0.207	1.71
30×30	S43	3300	0.075	2.24	2200	0.113	2.10	1500	0.166	2.00
30×35	S44	3900	0.064	2.55	2700	0.092	2.43	1800	0.138	2.27
30×40	S45	4700	0.053	2.90	3300	0.075	2.78	2200	0.113	2.59
30×45	S46	5600	0.044	3.28	3900	0.064	3.12	2700	0.092	2.94
30×50	S47	6800	0.037	3.73	4700	0.053	3.56	3300	0.075	3.32
35×25	S52	3300	0.075	2.41	2200	0.113	2.17	1500	0.166	2.07
35×30	S53	4700	0.053	2.83	3300	0.075	2.71	2200	0.113	2.52
35×35	S54	5600	0.044	3.24	3900	0.064	3.07	2700	0.092	2.90
35×40	S55	6800	0.037	3.71	4700	0.053	3.50	3300	0.075	3.31
35×45	S56	8200	0.030	4.16	5600	0.044	3.87	3900	0.064	3.69
35×50	S57	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.

**NOTE**

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

Standard Ratings

Case φD×L (mm)		Rated voltage (V) Item Casing symbol		160			180			200		
				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
22×25	S22	330	0.754	1.16	270	0.922	1.08	220	1.131	1.08		
22×30	S23	390	0.638	1.43	330	0.754	1.30	330	0.754	1.30		
22×35	S24	470	0.529	1.52	470	0.529	1.50	390	0.638	1.41		
22×40	S25	560	0.444	1.62	560	0.444	1.62	470	0.529	1.50		
22×45	S26	680	0.366	1.70	—	—	—	560	0.444	1.58		
22×50	S27	820	0.303	1.81	680	0.366	1.76	680	0.366	1.68		
25×25	S32	470	0.529	1.55	390	0.638	1.35	330	0.754	1.35		
25×30	S33	560	0.444	1.73	470	0.529	1.62	470	0.529	1.47		
25×35	S34	680	0.366	1.81	560	0.444	1.69	560	0.444	1.65		
25×40	S35	820	0.303	1.98	680	0.366	1.72	680	0.366	1.80		
25×45	S36	1000	0.249	2.04	820	0.303	1.78	—	—	—		
25×50	S37	1200	0.207	2.12	1000	0.249	1.91	820	0.303	1.87		
30×25	S42	680	0.366	1.82	560	0.444	1.67	470	0.529	1.56		
30×30	S43	820	0.303	1.98	680	0.366	1.74	680	0.366	1.82		
30×35	S44	1000	0.249	2.14	820	0.303	1.85	820	0.303	1.99		
30×40	S45	1200	0.207	2.22	1000	0.249	2.01	—	—	—		
30×45	S46	1500	0.166	2.46	1200	0.207	2.19	1000	0.249	2.17		
30×50	S47	—	—	—	1500	0.166	2.36	1200	0.207	2.22		
35×25	S52	820	0.303	1.93	680	0.366	1.92	680	0.366	1.96		
35×30	S53	1200	0.249	2.40	1000	0.249	2.16	820	0.303	2.07		
35×35	S54	1500	0.166	2.53	1200	0.207	2.34	1000	0.249	2.22		
35×40	S55	—	—	—	1500	0.166	2.56	1200	0.207	2.42		
35×45	S56	1800	0.138	2.98	1800	0.138	2.67	1500	0.166	2.59		
35×50	S57	2200	0.113	3.10	—	—	—	1800	0.138	2.70		

Large Capacitance Aluminum Electrolytic Capacitors

Case φD×L (mm)		Rated voltage (V) Item Casing symbol		250			400			450		
				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
22×25	S22	180	1.382	0.94	68	4.879	0.47	56	5.924	0.47		
22×30	S23	220	1.131	1.10	82	4.046	0.56	68	4.879	0.56		
22×35	S24	270	0.922	1.13	120	2.765	0.64	82	4.046	0.64		
22×40	S25	330	0.754	1.20	150	2.212	0.70	100	3.317	0.70		
22×45	S26	390	0.638	1.26	—	—	—	120	2.765	0.73		
22×50	S27	470	0.529	1.37	180	1.843	0.78	150	2.212	0.78		
25×25	S32	220	1.131	1.15	82	4.046	0.65	68	4.879	0.65		
25×30	S33	330	0.754	1.30	120	2.765	0.70	100	3.317	0.70		
25×35	S34	390	0.638	1.41	150	2.212	0.73	120	2.765	0.73		
25×40	S35	470	0.529	1.52	180	1.843	0.82	150	2.212	0.82		
25×45	S36	560	0.444	1.59	220	1.508	0.87	180	1.843	0.87		
25×50	S37	680	0.366	1.66	270	1.229	0.94	220	1.508	0.94		
30×25	S42	330	0.754	1.30	120	2.765	0.78	100	3.317	0.78		
30×30	S43	470	0.529	1.36	180	1.843	0.83	150	2.212	0.83		
30×35	S44	560	0.444	1.57	220	1.508	0.86	180	1.843	0.83		
30×40	S45	680	0.366	1.76	270	1.229	0.95	220	1.508	0.95		
30×45	S46	820	0.303	1.83	330	1.005	1.11	270	1.229	1.11		
30×50	S47	1000	0.249	1.87	390	0.851	1.15	330	1.005	1.15		
35×25	S52	470	0.529	1.40	180	1.843	0.86	150	2.212	0.86		
35×30	S53	560	0.444	1.56	270	1.229	0.91	220	1.508	0.91		
35×35	S54	820	0.303	1.82	330	1.005	1.13	270	1.229	1.13		
35×40	S55	1000	0.249	1.99	390	0.851	1.26	330	1.005	1.26		
35×45	S56	1200	0.207	2.10	470	0.706	1.31	390	0.851	1.31		
35×50	S57	—	—	—	560	0.592	1.50	470	0.706	1.50		

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

NOTE

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

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

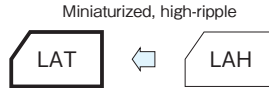
GREEN CAP

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

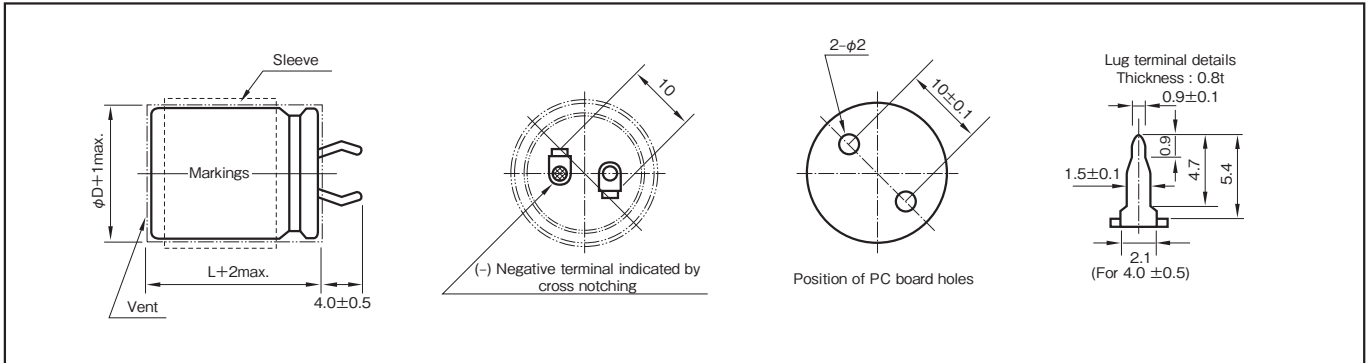


### Specifications

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)	

### 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.

### NOTE

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

Standard Ratings

Rated voltage(V) Case φ D×L(mm) Casing symbol		Item	160			180			200		
			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
22×25	S22	390	0.638	1.30	330	0.754	1.20	270	0.922	1.10	
22×30	S23	470	0.529	1.47	390	0.638	1.30	390	0.638	1.31	
22×35	S24	560	0.444	1.58	470	0.529	1.50	470	0.529	1.50	
22×40	S25	680	0.366	1.71	560	0.444	1.62	560	0.444	1.56	
22×45	S26	820	0.303	2.00	680	0.366	1.70	680	0.366	1.74	
22×50	S27	1000	0.249	2.20	820	0.303	2.00	—	—	—	
25×25	S32	470	0.529	1.55	390	0.638	1.35	390	0.638	1.35	
25×30	S33	680	0.366	1.70	560	0.444	1.53	560	0.444	1.53	
25×35	S34	820	0.303	2.00	680	0.366	1.74	680	0.366	1.74	
25×40	S35	1000	0.249	2.20	820	0.303	2.00	—	—	—	
25×45	S36	1200	0.207	2.45	1000	0.249	2.23	820	0.303	2.04	
25×50	S37	—	—	—	1200	0.207	2.51	1000	0.249	2.30	
30×25	S42	680	0.366	1.82	560	0.444	1.67	560	0.444	1.67	
30×30	S43	1000	0.249	2.20	820	0.303	2.00	820	0.303	2.00	
30×35	S44	1200	0.207	2.44	1000	0.249	2.24	1000	0.249	2.24	
30×40	S45	1500	0.166	2.82	1200	0.207	2.52	1200	0.207	2.52	
30×45	S46	1800	0.138	3.31	1500	0.166	2.89	—	—	—	
30×50	S47	—	—	—	—	—	—	1500	0.166	3.03	
35×25	S52	1000	0.249	2.20	820	0.303	2.00	820	0.303	2.00	
35×30	S53	1500	0.166	2.50	1200	0.207	2.50	1000	0.249	2.30	
35×35	S54	1800	0.138	2.92	1500	0.166	2.89	1200	0.207	2.65	
35×40	S55	—	—	—	1800	0.138	3.05	1500	0.166	3.08	
35×45	S56	2200	0.113	3.48	—	—	—	1800	0.138	3.47	
35×50	S57	2700	0.092	3.97	2200	0.113	3.60	2200	0.113	3.78	

Large Capacitance  
Aluminum Electrolytic Capacitors

Rated voltage(V) Case φ D×L(mm) Casing symbol		Item	250			315			400		
			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
22×25	S22	220	1.131	1.00	120	2.765	0.75	82	4.046	0.64	
22×30	S23	270	0.922	1.14	150	2.212	0.82	100	3.317	0.69	
22×35	S24	330	0.754	1.26	180	1.843	0.91	120	2.765	0.75	
22×40	S25	390	0.638	1.49	220	1.508	1.02	150	2.212	0.82	
22×45	S26	470	0.529	1.57	270	1.229	1.16	180	1.843	0.90	
22×50	S27	560	0.444	1.67	330	1.005	1.20	220	1.508	1.05	
25×25	S32	270	0.922	1.18	180	1.843	0.90	120	2.765	0.75	
25×30	S33	330	0.754	1.30	220	1.508	1.00	150	2.212	0.84	
25×35	S34	470	0.529	1.57	270	1.229	1.10	180	1.843	0.94	
25×40	S35	560	0.444	1.79	330	1.005	1.20	220	1.508	1.07	
25×45	S36	—	—	—	390	0.851	1.30	270	1.229	1.20	
25×50	S37	680	0.366	1.84	470	0.706	1.40	330	1.005	1.32	
30×25	S42	390	0.638	1.31	270	1.229	1.10	150	2.212	0.82	
30×30	S43	560	0.444	1.79	330	1.005	1.20	220	1.508	1.06	
30×35	S44	680	0.366	2.00	390	0.851	1.30	270	1.229	1.21	
30×40	S45	820	0.303	2.16	470	0.706	1.40	330	1.005	1.39	
30×45	S46	—	—	—	560	0.592	1.50	390	0.851	1.55	
30×50	S47	1000	0.249	2.47	680	0.488	1.70	470	0.706	1.69	
35×25	S52	560	0.444	1.68	330	1.005	1.20	220	1.508	1.08	
35×30	S53	680	0.366	1.75	470	0.706	1.40	330	1.005	1.20	
35×35	S54	820	0.303	2.00	560	0.592	1.50	390	0.851	1.54	
35×40	S55	1000	0.249	2.30	680	0.488	1.70	470	0.706	1.74	
35×45	S56	1200	0.207	2.43	820	0.405	2.00	560	0.592	1.85	
35×50	S57	1500	0.166	2.96	—	—	—	—	—	—	

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

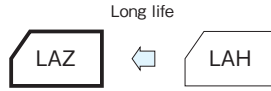
NOTE

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

## High-Reliability, High-Ripple, Long Life Capacitors

GREEN CAP 105°C 3000hours

- High-reliability, high-ripple, long life capacitors.
- Guarantees 3000 hours at 105°C.



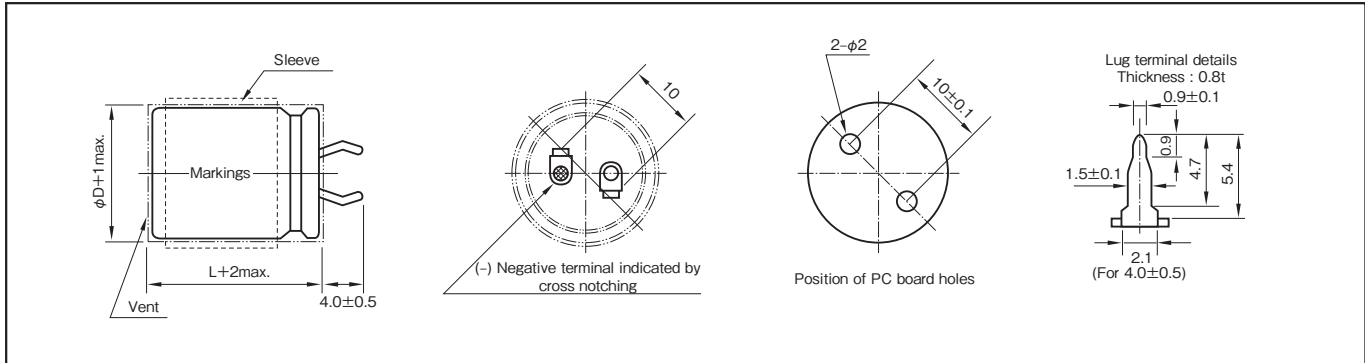
Marking color : White print on a black sleeve

### 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		
	Impedance ratio (max.)	Z-25°C/Z+20°C		4		4		4
Endurance (105°C) (Applied ripple current)	Test time	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						
Applicable standards	Voltage application treatment JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)							

### Outline Drawing

Unit: mm



Part numbering system (example : 200V470μF)

LAZ	—	200	V	471	M	S33	#
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
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

### 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 φD×L (mm)	Casing symbol	Item		Item		Item		Item		Item		Item		Item	
		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	Rated capacitance μF	Rated ripple current Arms	Rated capacitance μF	Rated ripple current Arms	Rated capacitance μF	Rated ripple current Arms
22×25	S22	6800	1.60	4700	1.55	3300	1.43	1800	1.31	1200	1.25	820	1.11	560	1.07
22×30	S23	10000	1.99	6800	1.91	3900	1.65	2700	1.70	1800	1.52	1200	1.39	820	1.35
22×35	S24	12000	2.28	8200	2.14	5600	2.02	3300	1.98	2200	1.73	1500	1.61	1000	1.54
22×40	S25	15000	2.64	10000	2.40	6800	2.28	3900	2.25	2700	1.97	1800	1.83	1200	1.74
22×45	S26	18000	2.98	12000	2.69	—	—	4700	2.56	—	—	2200	2.09	1500	1.99
22×50	S27	—	—	—	—	8200	2.67	5600	2.89	3300	2.32	—	—	—	—
25×25	S32	10000	1.99	6800	1.91	4700	1.78	2700	1.70	1800	1.52	1200	1.39	820	1.35
25×30	S33	12000	2.30	8200	2.16	5600	2.04	3300	2.00	2200	1.75	1500	1.62	1000	1.56
25×35	S34	15000	2.68	10000	2.44	6800	2.31	3900	2.28	2700	1.99	2200	2.01	1200	1.76
25×40	S35	18000	3.04	12000	2.74	8200	2.60	5600	2.81	3300	2.27	—	—	1500	2.03
25×45	S36	22000	3.40	15000	3.15	10000	2.92	—	—	3900	2.54	2700	2.43	1800	2.28
25×50	S37	27000	3.81	18000	3.54	12000	3.26	6800	3.37	4700	2.88	3300	2.76	2200	2.57
30×25	S42	12000	2.38	8200	2.25	5600	2.12	3900	2.22	2700	1.93	1800	1.81	1200	1.71
30×30	S43	18000	3.00	12000	2.70	8200	2.56	4700	2.58	3300	2.24	2200	2.10	1500	2.00
30×35	S44	22000	3.39	15000	3.13	10000	2.92	5600	2.95	3900	2.55	2700	2.43	1800	2.27
30×40	S45	27000	3.83	18000	3.54	12000	3.28	6800	3.39	4700	2.90	3300	2.78	2200	2.59
30×45	S46	33000	4.30	22000	4.24	15000	3.74	8200	3.71	5600	3.28	3900	3.12	2700	2.94
30×50	S47	39000	4.74	—	—	—	—	10000	4.09	6800	3.73	4700	3.56	3300	3.32
35×25	S52	18000	3.10	12000	2.80	8200	2.78	4700	2.67	3300	2.41	2200	2.17	1500	2.07
35×30	S53	27000	3.74	15000	3.22	12000	3.20	6800	3.31	4700	2.83	3300	2.71	2200	2.52
35×35	S54	33000	4.24	22000	3.96	15000	3.69	8200	3.66	5600	3.24	3900	3.07	2700	2.90
35×40	S55	39000	4.72	—	—	18000	4.16	10000	4.07	6800	3.71	4700	3.50	3300	3.31
35×45	S56	47000	5.27	27000	4.75	—	—	12000	4.50	8200	4.16	5600	3.87	3900	3.69
35×50	S57	—	—	33000	5.39	22000	4.92	—	—	10000	4.69	6800	4.19	4700	4.14

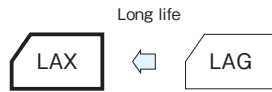
Rated voltage (V)		160		180		200		250		400		450	
Case φD×L (mm)	Casing symbol	Item		Item		Item		Item		Item		Item	
		Rated capacitance μF	Rated ripple current Arms	Rated capacitance μF	Rated ripple current Arms	Rated capacitance μF	Rated ripple current Arms	Rated capacitance μF	Rated ripple current Arms	Rated capacitance μF	Rated ripple current Arms	Rated capacitance μF	Rated ripple current Arms
22×25	S22	330	1.16	270	1.08	220	1.08	180	0.94	68	0.47	56	0.47
22×30	S23	390	1.43	330	1.30	330	1.30	220	1.10	82	0.56	68	0.56
22×35	S24	470	1.52	470	1.50	390	1.41	270	1.13	120	0.64	82	0.64
22×40	S25	560	1.62	560	1.62	470	1.50	330	1.20	150	0.70	100	0.70
22×45	S26	680	1.70	—	—	560	1.58	390	1.26	—	—	120	0.73
22×50	S27	820	1.81	680	1.76	680	1.68	470	1.37	180	0.78	150	0.78
25×25	S32	470	1.55	390	1.35	330	1.35	220	1.15	82	0.65	68	0.65
25×30	S33	560	1.73	470	1.62	470	1.47	330	1.30	120	0.70	100	0.70
25×35	S34	680	1.81	560	1.69	560	1.65	390	1.41	150	0.73	120	0.73
25×40	S35	820	1.98	680	1.72	680	1.80	470	1.52	180	0.82	150	0.82
25×45	S36	1000	2.04	820	1.78	—	—	560	1.59	220	0.87	180	0.87
25×50	S37	1200	2.12	1000	1.91	820	1.87	680	1.66	270	0.94	220	0.94
30×25	S42	680	1.82	560	1.67	470	1.56	330	1.30	120	0.78	100	0.78
30×30	S43	820	1.98	680	1.74	680	1.82	470	1.36	180	0.83	150	0.83
30×35	S44	1000	2.14	820	1.85	820	1.99	560	1.57	220	0.86	180	0.86
30×40	S45	1200	2.22	1000	2.01	—	—	680	1.76	270	0.95	220	0.95
30×45	S46	1500	2.46	1200	2.19	1000	2.17	820	1.83	330	1.11	270	1.11
30×50	S47	—	—	1500	2.36	1200	2.22	1000	1.87	390	1.15	330	1.15
35×25	S52	820	1.93	680	1.92	680	1.96	470	1.40	180	0.86	150	0.86
35×30	S53	1200	2.40	1000	2.16	820	2.07	560	1.56	270	0.91	220	0.91
35×35	S54	1500	2.53	1200	2.34	1000	2.22	820	1.82	330	1.13	270	1.13
35×40	S55	—	—	1500	2.56	1200	2.42	1000	1.99	390	1.26	330	1.26
35×45	S56	1800	2.98	1800	2.67	1500	2.59	1200	2.10	470	1.31	390	1.31
35×50	S57	2200	3.10	—	—	1800	2.70	—	—	560	1.50	470	1.50

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

## Ultra Long Life, High-Reliability Capacitors

GREEN CAP 105°C 5000hours

- Ultra 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	JIS C5101-1, -4 1998 (IEC 60384-1 1992, -4 1985)	

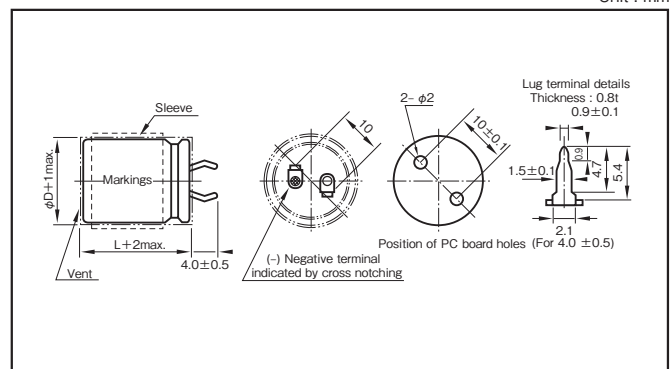
### Standard Ratings

Case φDxL (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

Frequency (Hz)	50	120	1k	10k	30k
Rated voltage (V)					
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.

### NOTE

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

## Aluminum Electrolytic Capacitors for Audio

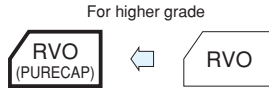
## Chip Type Audio Use Capacitors

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 ( $\phi 8 \times 10L, \phi 10 \times 10L$ )

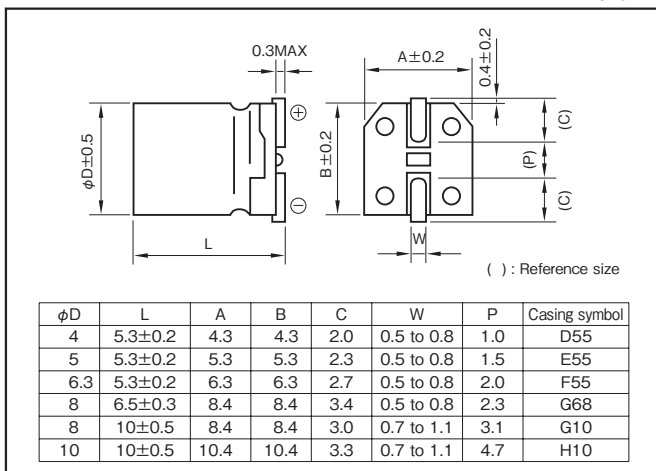


### Specifications

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

Frequency (Hz)	50	120	1k	10k-100k
Rated voltage (V)				
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			

• Soldering conditions are described on page 11. • Land pattern size are described on page 12. • The taping specifications are described on page 13.

### 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
Item	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms
0.1	—	—	—	—	—	—	—	—	—	—	4×5.3	3
0.22	—	—	—	—	—	—	—	—	—	—	4×5.3	5
0.33	—	—	—	—	—	—	—	—	—	—	4×5.3	6
0.47	—	—	—	—	—	—	—	—	—	—	4×5.3	7
1	—	—	—	—	—	—	—	—	—	—	4×5.3	10
2.2	—	—	—	—	—	—	—	—	—	—	4×5.3	15
3.3	—	—	—	—	—	—	—	—	—	—	4×5.3	19
4.7	—	—	—	—	—	—	—	—	—	—	4×5.3	26
10	—	—	4×5.3	23	4×5.3	26	5×5.3	32	5×5.3	34	6.3×5.3	44
22	4×5.3	31	5×5.3	40	5×5.3	44	6.3×5.3	55	6.3×5.3	59	8×6.5	124
33	5×5.3	44	5×5.3	49	6.3×5.3	63	6.3×5.3	67	8×6.5	124	8×6.5	124
47	5×5.3	53	6.3×5.3	68	6.3×5.3	76	8×6.5	124	8×6.5	124	8×10	200
100	6.3×5.3	90	6.3×5.3	99	8×6.5	124	8×6.5	137	8×10	200	10×10	366
220	8×6.5	149	8×6.5	149	8×10	200	8×10	235	10×10	366	—	—
330	8×6.5	160	8×10	226	8×10	245	10×10	366	—	—	—	—
470	8×10	251	10×10	366	10×10	366	—	—	—	—	—	—
1000	10×10	423	—	—	—	—	—	—	—	—	—	—

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

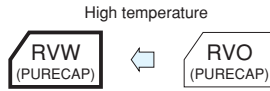
### NOTE

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

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.

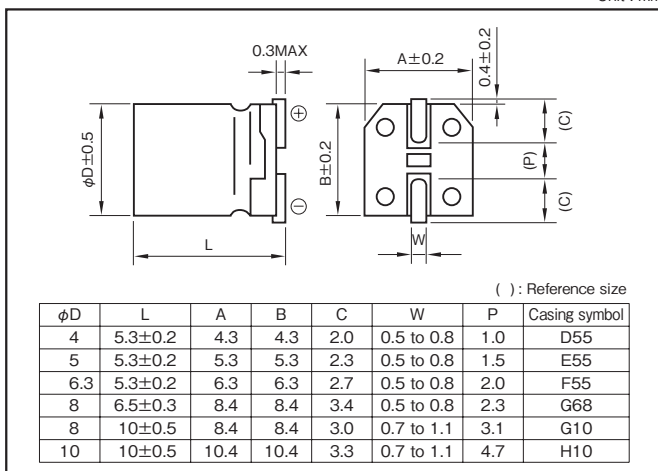


Marking color : Black print (except height : 10mm)  
White print on a brown sleeve (φ8×10L, φ10×10L)

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)
	tanδ (max.)
Characteristics at high and low temperature	Rated voltage (V)
	Impedance ratio (max.)
Endurance (105°C) (Applied ripple current)	Test time
	Leakage current
	Percentage of capacitance change
	Tangent of the loss angle
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



Coefficient of Frequency for Rated Ripple Current

Frequency (Hz)	50	120	1k	10k-100k
Rated voltage (V)				
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 : 16V471 M H10 □ U □)



- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

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
Item	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms
0.1	—	—	—	—	—	—	—	—	—	—	4×5.3	2
0.22	—	—	—	—	—	—	—	—	—	—	4×5.3	3
0.33	—	—	—	—	—	—	—	—	—	—	4×5.3	4
0.47	—	—	—	—	—	—	—	—	—	—	4×5.3	5
1	—	—	—	—	—	—	—	—	—	—	4×5.3	7
2.2	—	—	—	—	—	—	—	—	—	—	4×5.3	10
3.3	—	—	—	—	—	—	—	—	—	—	4×5.3	12
4.7	—	—	—	—	—	—	—	—	—	—	4×5.3	17
10	—	—	4×5.3	15	4×5.3	16	5×5.3	21	5×5.3	23	6.3×5.3	26
22	4×5.3	21	5×5.3	25	5×5.3	28	6.3×5.3	36	6.3×5.3	50	8×6.5	110
33	5×5.3	30	5×5.3	31	6.3×5.3	40	6.3×5.3	44	8×6.5	110	8×10	178
47	5×5.3	36	6.3×5.3	43	6.3×5.3	47	8×6.5	110	8×10	178	8×10	178
100	6.3×5.3	61	8×6.5	110	8×10	178	8×10	178	10×10	324	10×10	324
220	8×10	178	8×10	178	10×10	324	10×10	324	10×10	324	—	—
330	8×10	178	10×10	324	10×10	324	—	—	—	—	—	—
470	10×10	324	10×10	324	10×10	324	—	—	—	—	—	—

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

NOTE

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

## Chip Type Audio Use Capacitors

GREEN CAP SMD For audio

- New developed Al-Foil and Electrolyte for Audio grade allow lower distortion.
- New range of bright and smooth sound is achieved in SMD area.



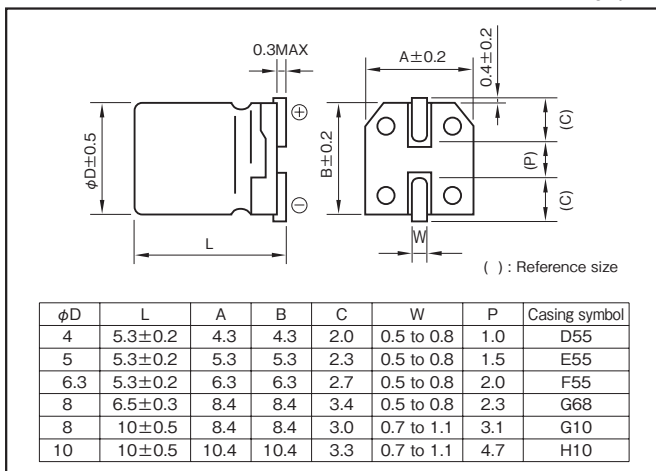
Marking color : Black print

### 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
	tanδ (max.)	0.28	0.24	0.20	0.16	0.14
Characteristics at high and low temperature	Impedance ratio (max.)	Z-25°C/Z+20°C	4	3	2	2
		Z-40°C/Z+20°C	8	5	4	3
	(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 : 500 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

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

### Part numbering system (example : 16V47 µF)

RVG	—	16	V	470	M	F55	□	U	□
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol		Taping symbol

- Soldering conditions are described on page 11.
- Land pattern size are described on page 12.
- The taping specifications are described on page 13.

### Standard Ratings

Rated voltage (V)	6.3		10		16		25		35	
	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current	Case	Rated ripple current
	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms
3.3	—	—	—	—	—	—	—	—	4×5.3	11
4.7	—	—	—	—	4×5.3	11	4×5.3	12	4×5.3	13
10	—	—	—	—	5×5.3	19	5×5.3	21	5×5.3	22
22	4×5.3	20	—	—	5×5.3	28	6.3×5.3	36	6.3×5.3	39
33	5×5.3	29	5×5.3	31	6.3×5.3	40	6.3×5.3	44	8×6.5	60
47	5×5.3	34	6.3×5.3	43	6.3×5.3	47	8×6.5	66	8×10	82
100	6.3×5.3	58	8×6.5	79	8×6.5	87	8×10	112	10×10	139
220	8×6.5	107	8×10	136	8×10	149	10×10	192	—	—
330	8×10	153	8×10	166	10×10	221	—	—	—	—
470	8×10	183	10×10	229	—	—	—	—	—	—

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

### NOTE

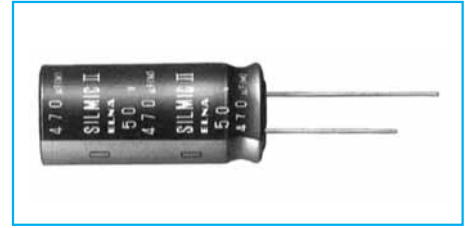
Design, Specifications are subject to change without notice.  
Ask factory for technical specifications before purchase and/or use.

**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.

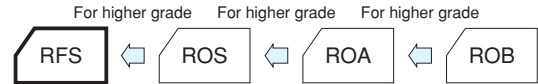


**Miniature High Grade Capacitors for Audio(SILMIC II)**

GREEN CAP

For audio

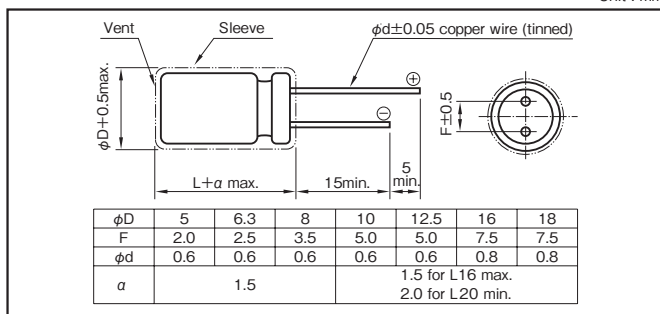
- All lead wires oxygen-free copper for extremely low distortion. (Third high frequency distortion 10kHz,0.1A,-120dB or less)
- "SILMIC II" mark on sleeve.



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)									

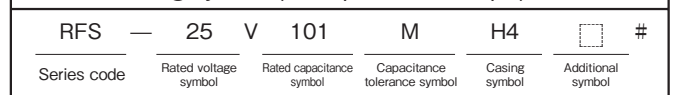
Outline Drawing



Coefficient of Frequency for Rated Ripple Current

Rated voltage (V)	Frequency (Hz) CV (µF×VV)	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 φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol
5×11	E3	10×12.5	H3	12.5×20	I5	16×31.5	J7
6.3×11	F3	10×16	H4	12.5×25	I6	16×35.5	J8
8×11.5	G3	10×20	H5	16×25	J6	18×35.5	K8
				18×40	K9		

Standard Ratings

Rated capacitance (µF)	6.3		10		16		25		35		50		63		100	
	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms
0.47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	10
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	20
2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5×11	25
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6.3×11	30
3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
220	10×12.5	240	10×16	260	10×20	385	12.5×20	505	12.5×25	550	16×25	720	16×31.5	785	18×40	930
330	10×16	290	10×20	350	12.5×20	545	12.5×25	675	16×25	785	16×31.5	965	16×35.5	1010	—	—
470	10×20	390	12.5×20	455	12.5×25	710	16×25	940	16×31.5	1030	16×35.5	1210	18×35.5	1295	—	—
1000	12.5×20	710	16×25	835	16×31.5	1315	16×35.5	1575	18×35.5	1690	18×40	1985	—	—	—	—
2200	—	—	16×35.5	1500	18×40	2150	—	—	—	—	—	—	—	—	—	—
3300	—	—	18×40	1980	—	—	—	—	—	—	—	—	—	—	—	—

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

NOTE

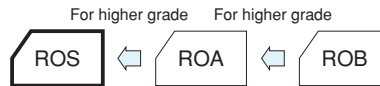
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.

### 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.

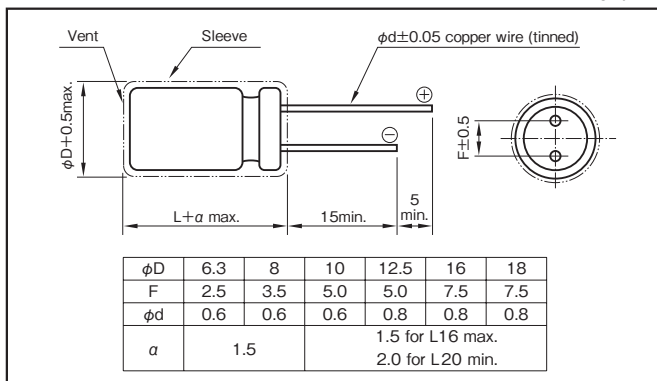


#### Specifications

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

Unit : mm



#### Coefficient of Frequency for Rated Ripple Current

Rated voltage (V)	Frequency (Hz) CV(μF×VV)	50 · 60	120	1k	10k	100k
		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)

ROS	—	25	V	101	M	H4	□	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol	

#### Case symbol

Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol
5×11	E3	10×12.5	H3	12.5×20	I5	16×31.5	J7
6.3×11	F3	10×16	H4	12.5×25	I6	16×35.5	J8
8×11.5	G3	10×20	H5	16×25	J6	18×35.5	K8
						18×40	K9

#### Standard Ratings

Rated voltage (V)	Item	16		25		35		50		63		100	
		Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms
0.47		—	—	—	—	—	—	—	—	—	—	—	—
1		—	—	—	—	—	—	—	—	—	—	—	—
2.2		—	—	—	—	—	—	—	—	—	—	6.3×11	25
3.3		—	—	—	—	—	—	—	—	—	—	8×11.5	35
4.7		—	—	—	—	—	—	6.3×11	40	6.3×11	40	10×12.5	60
10		—	—	—	—	6.3×11	55	8×11.5	75	8×11.5	75	10×16	95
22		6.3×11	70	6.3×11	80	8×11.5	95	10×12.5	130	10×16	140	10×20	155
33		6.3×11	90	8×11.5	120	10×12.5	140	10×16	175	10×20	190	12.5×20	220
47		8×11.5	125	8×11.5	140	10×12.5	170	10×16	210	10×20	225	12.5×25	285
100		10×12.5	215	10×16	270	10×20	295	12.5×20	380	12.5×25	415	16×25	485
220		10×20	385	12.5×20	505	12.5×25	550	16×25	720	16×31.5	785	18×40	930
330		12.5×20	545	12.5×25	675	16×25	785	16×31.5	965	16×35.5	1010	—	—
470		12.5×25	710	16×25	940	16×31.5	1030	16×35.5	1210	18×35.5	1295	—	—
1000		16×31.5	1315	16×35.5	1575	18×35.5	1690	18×40	1985	—	—	—	—
2200		18×40	2150	—	—	—	—	—	—	—	—	—	—

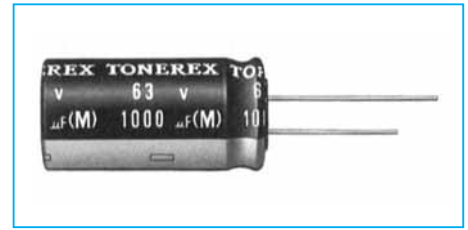
(Note) Rated ripple current : 85°C, 120Hz.

#### NOTE

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

Miniature Standard Capacitors for Audio

GREEN CAP For audio



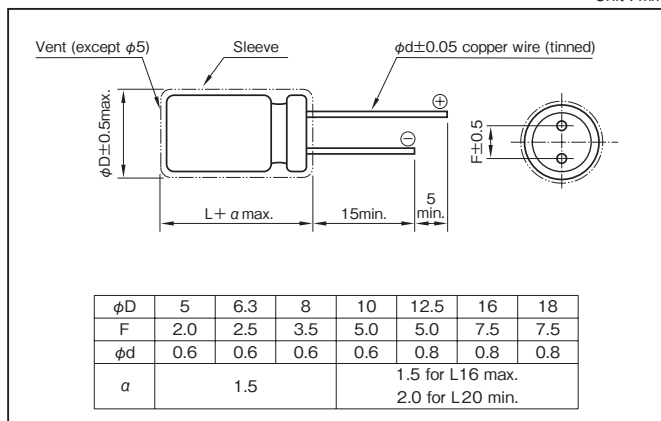
TONEREX

- 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)									

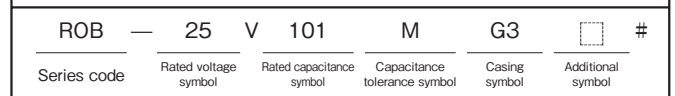
Outline Drawing



Coefficient of Frequency for Rated Ripple Current

Rated voltage (V)	Frequency (Hz) CV (µF×VV)	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 φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol
5×11	E3	10×12.5	H3	12.5×20	I5	16×31.5	J7
6.3×11	F3	10×16	H4	12.5×25	I6	16×35.5	J8
8×11.5	G3	10×20	H5	16×25	J6	18×35.5	K8
						18×40	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
		φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms	φD×L (mm)	mArms
0.47	—	—	—	—	—	—	—	—	—	—	—	5×11	5	—	—	5×11	10
1	—	—	—	—	—	—	—	—	—	—	—	5×11	10	—	—	5×11	15
2.2	—	—	—	—	—	—	—	—	—	—	—	5×11	20	—	—	5×11	25
3.3	—	—	—	—	—	—	—	—	—	—	—	5×11	25	—	—	5×11	30
4.7	—	—	—	—	—	—	—	5×11	25	—	—	5×11	35	5×11	35	6.3×11	40
10	—	—	—	—	5×11	35	5×11	40	5×11	45	5×11	50	6.3×11	60	8×11.5	70	
22	—	—	5×11	50	5×11	60	5×11	60	6.3×11	75	6.3×11	80	8×11.5	100	10×12.5	120	
33	5×11	55	5×11	65	5×11	70	6.3×11	80	6.3×11	90	8×11.5	110	8×11.5	115	10×16	160	
47	5×11	65	5×11	75	6.3×11	95	6.3×11	100	8×11.5	120	8×11.5	130	10×12.5	165	10×20	210	
100	6.3×11	110	6.3×11	120	8×11.5	150	8×11.5	165	10×12.5	210	10×16	250	10×20	285	12.5×20	340	
220	8×11.5	185	8×11.5	200	10×12.5	265	10×16	310	10×20	365	12.5×20	440	12.5×20	470	16×25	620	
330	10×12.5	265	10×12.5	200	10×16	350	10×20	410	12.5×20	500	12.5×20	540	12.5×25	620	16×31.5	820	
470	10×12.5	315	10×16	380	10×20	460	12.5×20	550	12.5×25	640	16×25	800	16×25	840	18×35.5	1000	
1000	10×20	550	12.5×20	670	12.5×25	810	16×25	1000	16×25	1050	16×31.5	1200	18×35.5	1500	—	—	
2200	12.5×25	980	16×25	1200	16×25	1350	16×35.5	1650	18×35.5	1900	—	—	—	—	—	—	
3300	16×25	1300	16×31.5	1600	16×35.5	1800	18×40	2100	—	—	—	—	—	—	—	—	
4700	16×31.5	1700	16×35.5	1900	18×35.5	2400	—	—	—	—	—	—	—	—	—	—	
6800	16×35.5	2100	18×40	2600	—	—	—	—	—	—	—	—	—	—	—	—	
10000	18×40	2800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

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

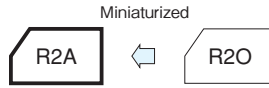
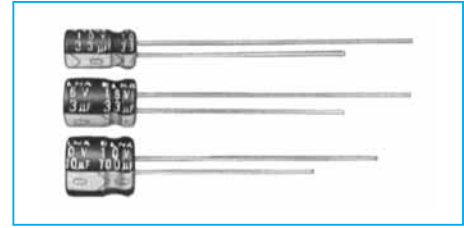
NOTE

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

## 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.

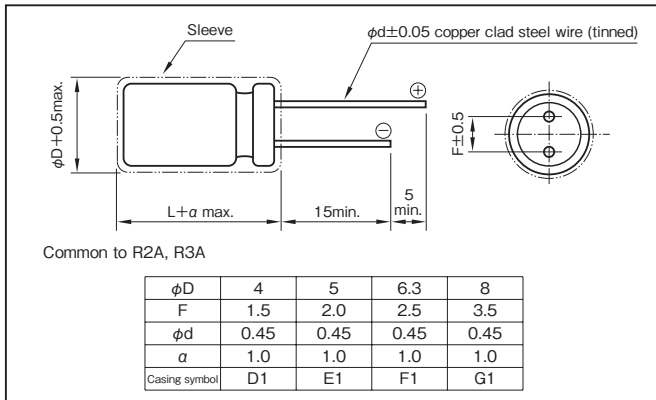


### Specifications

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 (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 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 : 25V10µF)

R2A	—	25	V	100	M	D1	□	#
Series code		Rated voltage symbol		Rated capacitance symbol	Capacitance tolerance symbol	Casing symbol	Additional symbol	

### Standard Ratings

φD×L (mm)

Rated voltage (V)	6.3	10	16	25	35	50
0.1	—	—	—	—	—	4×7
0.22	—	—	—	—	—	4×7
0.33	—	—	—	—	—	4×7
0.47	—	—	—	—	—	4×7
1	—	—	—	—	—	4×7
2.2	—	—	—	—	—	4×7
3.3	—	—	—	—	—	4×7
4.7	—	—	—	—	4×7	5×7
10	—	—	—	4×7	5×7	6.3×7
22	—	4×7	—	5×7	—	6.3×7
33	4×7	—	5×7	6.3×7	6.3×7	8×7
47	—	5×7	—	6.3×7	8×7	—
100	5×7	6.3×7	6.3×7	8×7	—	—
220	6.3×7	8×7	—	—	—	—
330	8×7	—	—	—	—	—

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

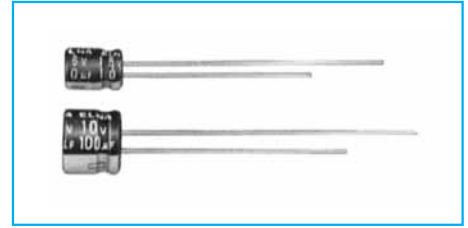
### NOTE

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

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.

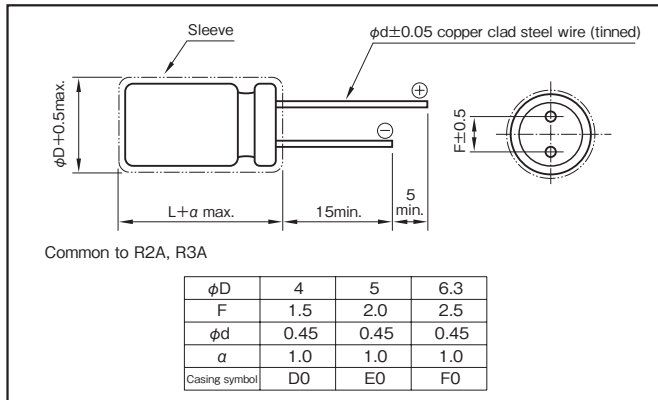


Specifications

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
		Z-40°C/Z+20°C	16	10	8	6	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 : 500hours ; 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	

Aluminum Electrolytic Capacitors for Audio

Standard Ratings

φD×L (mm)

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

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

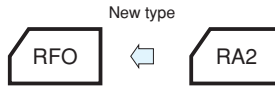
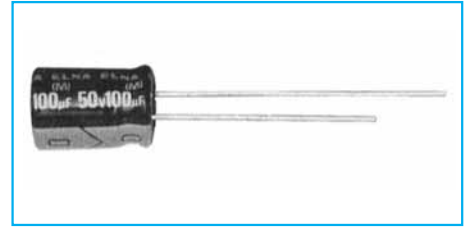
NOTE

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

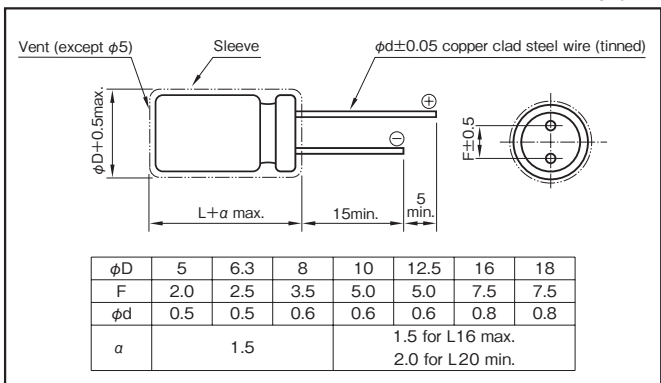
- A standard capacitor utilizing a newly developed material for a high grade of audio reproduction.
- Copper clad steel wire is used for leads.
- New type miniaturized capacitor for audio, using synthetic mica paper for the separator.



### 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)								

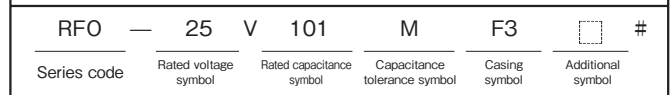
### Outline Drawing



### Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency(Hz) CV(µF×VV)	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 φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol
5×11	E3	10×12.5	H3	12.5×20	I5	16×31.5	J7
6.3×11	F3	10×16	H4	12.5×25	I6	16×35.5	J8
8×11.5	G3	10×20	H5	16×25	J6	18×35.5	K8
				18×40			K9

### Standard Ratings

Rated capacitance (µF)	6.3		10		16		25		35		50		63		100	
	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms
0.47	—	—	—	—	—	—	—	—	—	—	5×11	10	—	—	5×11	10
1	—	—	—	—	—	—	—	—	—	—	5×11	15	—	—	5×11	15
2.2	—	—	—	—	—	—	—	—	—	—	5×11	20	—	—	5×11	25
3.3	—	—	—	—	—	—	—	—	—	—	5×11	25	—	—	5×11	30
4.7	—	—	—	—	—	—	—	—	—	—	5×11	30	5×11	35	5×11	35
10	—	—	—	—	—	—	—	—	—	—	5×11	45	5×11	50	6.3×11	60
22	—	—	—	—	5×11	50	5×11	55	5×11	60	5×11	70	6.3×11	85	8×11.5	110
33	—	—	5×11	55	5×11	60	5×11	70	5×11	80	6.3×11	100	6.3×11	100	10×12.5	160
47	—	—	5×11	65	5×11	75	5×11	85	6.3×11	110	6.3×11	120	8×11.5	150	10×16	210
100	5×11	85	5×11	95	6.3×11	120	6.3×11	140	8×11.5	190	8×11.5	210	10×12.5	260	12.5×20	380
220	6.3×11	150	6.3×11	165	8×11.5	220	8×11.5	250	10×12.5	330	10×16	400	10×20	460	16×25	720
330	6.3×11	180	8×11.5	240	8×11.5	270	10×12.5	370	10×16	450	10×20	540	12.5×20	650	16×25	880
470	8×11.5	260	8×11.5	280	10×12.5	390	10×16	480	10×20	590	12.5×20	740	12.5×25	850	16×31.5	1150
1000	10×12.5	450	10×16	540	10×20	680	12.5×20	880	12.5×25	1050	16×25	1350	16×31.5	1550	—	—
2200	12.5×20	890	12.5×20	970	12.5×25	1200	16×25	1550	16×31.5	1750	16×35.5	2100	—	—	—	—
3300	12.5×20	1050	12.5×25	1250	16×25	1600	16×31.5	1950	18×35.5	2250	—	—	—	—	—	—
4700	16×25	1550	16×25	1650	16×31.5	2050	18×35.5	2500	—	—	—	—	—	—	—	—
6800	16×25	1750	16×31.5	2050	18×35.5	2550	—	—	—	—	—	—	—	—	—	—
10000	16×31.5	2150	18×35.5	2550	—	—	—	—	—	—	—	—	—	—	—	—
15000	18×35.5	2700	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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

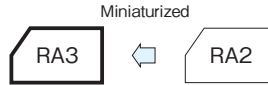
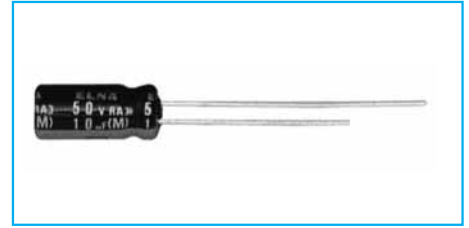
### NOTE

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

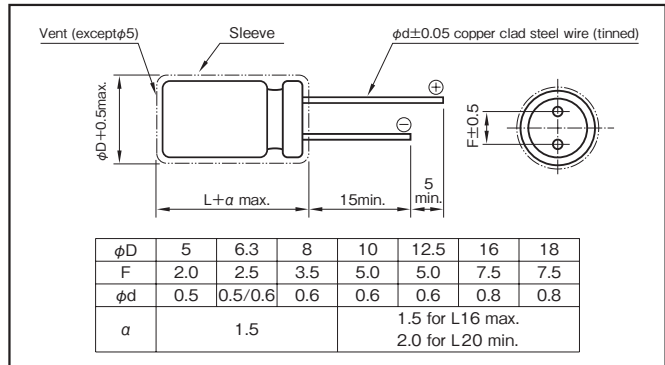
- With the same size as that for Series RE3 miniaturized standard capacitors, a high resolution sound quality grade has been realized.
- The newly developed audio use material makes clear sound a reality.
- All lead wires are copper clad steel.



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)								

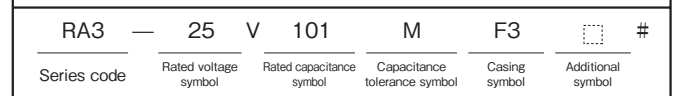
Outline Drawing



Coefficient of Frequency for Rated Ripple Current

Rated voltage(V)	Frequency (Hz) CV (µF×WV)	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 φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol
5×11	E3	10×12.5	H3	12.5×20	I5	16×31.5	J7
6.3×11	F3	10×16	H4	12.5×25	I6	18×35.5	K8
8×11.5	G3	10×20	H5	16×25	J6	—	—

Standard Ratings

Rated capacitance (µF)	6.3		10		16		25		35		50		63		100	
	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms
0.1	—	—	—	—	—	—	—	—	—	—	5×11	3	—	—	—	—
0.22	—	—	—	—	—	—	—	—	—	—	5×11	6	—	—	—	—
0.33	—	—	—	—	—	—	—	—	—	—	5×11	9	—	—	—	—
0.47	—	—	—	—	—	—	—	—	—	—	5×11	13	—	—	5×11	13
1	—	—	—	—	—	—	—	—	—	—	5×11	21	—	—	5×11	21
2.2	—	—	—	—	—	—	—	—	—	—	5×11	31	—	—	5×11	31
3.3	—	—	—	—	—	—	—	—	—	—	5×11	38	—	—	5×11	40
4.7	—	—	—	—	—	—	—	—	—	—	5×11	45	—	—	5×11	50
10	—	—	—	—	5×11	50	5×11	55	5×11	60	5×11	66	5×11	70	5×11	70
22	—	—	—	—	5×11	75	5×11	90	5×11	95	5×11	100	5×11	105	6.3×11	115
33	—	—	—	—	5×11	110	5×11	110	5×11	110	5×11	110	6.3×11	130	8×11.5	158
47	—	—	—	—	5×11	130	5×11	130	5×11	130	6.3×11	155	6.3×11	160	8×11.5	188
100	5×11	130	5×11	150	5×11	180	6.3×11	199	6.3×11	214	8×11.5	250	8×11.5	270	10×16	358
220	5×11	240	6.3×11	250	6.3×11	280	8×11.5	349	8×11.5	350	10×12.5	429	10×16	505	12.5×20	663
330	6.3×11	300	6.3×11	330	8×11.5	383	8×11.5	383	10×12.5	542	10×16	595	10×20	676	12.5×25	886
470	6.3×11	380	8×11.5	417	8×11.5	480	10×12.5	545	10×16	664	12.5×20	887	12.5×20	924	16×25	1230
1000	8×11.5	580	10×12.5	650	10×16	791	10×20	996	12.5×20	1210	12.5×25	1400	16×25	1710	18×35.5	2210
2200	10×16	939	10×20	1080	12.5×20	1350	12.5×25	1660	16×25	1950	16×31.5	2340	18×35.5	2870	—	—
3300	16×20	1230	12.5×20	1430	12.5×25	1690	16×25	2030	16×31.5	2320	18×35.5	2810	—	—	—	—
4700	12.5×20	1710	12.5×25	1780	16×25	2100	16×31.5	2650	18×35.5	2290	—	—	—	—	—	—
6800	12.5×25	1930	16×25	2270	16×31.5	2480	18×35.5	3290	—	—	—	—	—	—	—	—
10000	16×25	2450	16×31.5	2500	18×35.5	3130	—	—	—	—	—	—	—	—	—	—
15000	16×31.5	2580	18×35.5	3100	—	—	—	—	—	—	—	—	—	—	—	—
22000	18×35.5	3150	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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

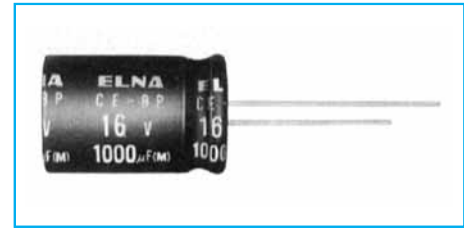
NOTE

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

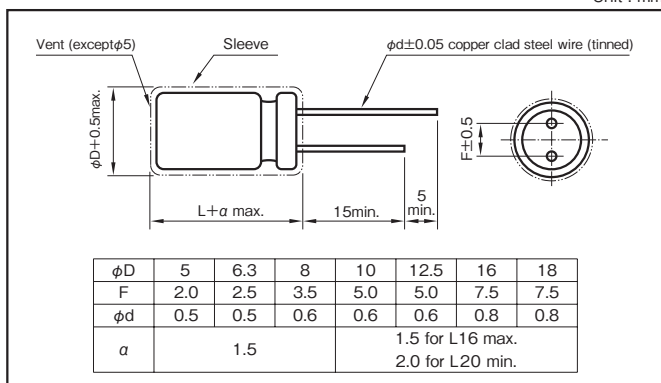
- The newly developed audio use foil and special electrolyte makes clear and far-carrying sound a reality.
- All lead wires are copper clad steel.



### 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 × 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

Frequency (Hz)	50 - 60	120	1k	10k - 100k
Rated voltage (V)				
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)

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

### Case symbol

Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol	Case φD×L (mm)	Casing Symbol
5×11	E3	10×12.5	H3	12.5×20	I5	16×31.5	J7
6.3×11	F3	10×16	H4	12.5×25	I6	16×35.5	J8
8×11.5	G3	10×20	H5	16×25	J6	18×35.5	K8
						18×40	K9

### Standard Ratings

Rated capacitance (µF)	6.3		10		16		25		35		50		63		100	
	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms	Case φD×L (mm)	Rated ripple current mArms
0.1	—	—	—	—	—	—	—	—	—	—	5×11	4	—	—	5×11	5
0.22	—	—	—	—	—	—	—	—	—	—	5×11	7	—	—	5×11	8
0.33	—	—	—	—	—	—	—	—	—	—	5×11	8	—	—	5×11	9
0.47	—	—	—	—	—	—	—	—	—	—	5×11	10	—	—	5×11	11
1	—	—	—	—	—	—	—	—	—	—	5×11	14	—	—	5×11	16
2.2	—	—	—	—	—	—	—	—	—	—	5×11	21	5×11	23	5×11	24
3.3	—	—	—	—	—	—	—	—	—	—	5×11	26	5×11	28	6.3×11	34
4.7	—	—	—	—	—	—	5×11	28	5×11	28	5×11	31	5×11	34	6.3×11	41
10	—	—	—	—	5×11	39	5×11	40	5×11	42	5×11	45	6.3×11	57	8×11.5	70
22	—	—	5×11	52	5×11	58	5×11	60	6.3×11	71	6.3×11	77	8×11.5	89	10×16	136
33	5×11	58	5×11	63	5×11	71	6.3×11	84	6.3×11	87	8×11.5	111	10×12.5	144	10×20	181
47	5×11	69	5×11	75	6.3×11	97	6.3×11	100	8×11.5	122	10×12.5	157	10×16	188	12.5×20	248
100	6.3×11	115	6.3×11	126	8×11.5	167	10×12.5	204	10×12.5	212	10×20	273	12.5×20	343	16×25	458
220	8×11.5	202	8×11.5	221	10×12.5	294	10×16	332	10×20	375	12.5×25	506	16×25	645	18×35.5	837
330	8×11.5	247	10×12.5	322	10×16	394	10×20	444	12.5×20	526	12.5×25	620	—	—	—	—
470	10×12.5	350	10×16	420	10×20	513	12.5×20	607	12.5×25	685	16×25	861	—	—	—	—
1000	10×20	611	12.5×20	767	12.5×25	935	16×25	1120	16×31.5	1270	—	—	—	—	—	—
2200	12.5×25	1090	16×25	1380	16×31.5	1660	—	—	—	—	—	—	—	—	—	—
3300	16×25	1490	16×31.5	1760	—	—	—	—	—	—	—	—	—	—	—	—
4700	16×31.5	1880	18×35.5	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.

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.

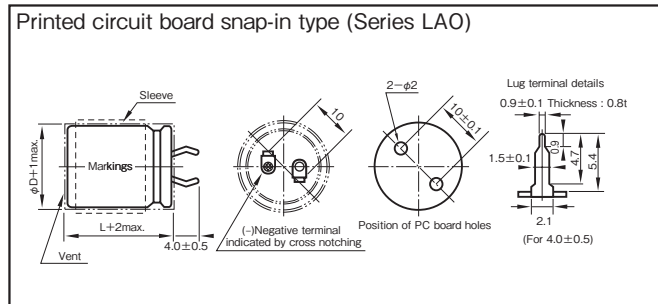


Specifications

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)
	tanδ (max.)
Characteristics at high and low temperature	Rated voltage (V)
	Impedance ratio (max.)
	Impedance ratio (max.)
Endurance (85°C) (Applied ripple current)	Test time
	Leakage current
	Percentage of capacitance change
	Tangent of the loss angle
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.

## Standard Ratings

Case φD×L (mm)	Rated voltage (V)	Item	16		25		35		50		63		80		100	
			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
22×20	S1	3300	1.2	—	—	—	—	—	—	—	—	—	—	—	—	
22×25	S1	4700	1.5	2200	1.0	1500	0.8	1000	0.8	680	0.7	—	—	—	—	
22×30	S1	—	—	3300	1.3	2200	1.3	1500	1.1	1000	0.9	680	0.7	—	—	
22×35	S1	6800	2.0	4700	1.7	3300	1.7	—	—	1500	1.2	1000	1.0	680	0.8	
22×40	S1	—	—	—	—	—	—	2200	1.5	—	—	—	—	—	—	
22×45	S1	10000	2.7	6800	2.2	4700	2.3	—	—	2200	1.6	—	—	—	—	
22×50	S1	—	—	—	—	—	—	3300	2.0	—	—	1500	1.3	1000	1.2	
25×25	S2	—	—	3300	1.7	2200	1.7	1500	1.4	1000	1.2	680	1.0	—	—	
25×30	S2	6800	2.5	4700	2.1	3300	2.2	2200	1.8	1500	1.5	1000	1.2	680	1.1	
25×35	S2	10000	3.2	—	—	—	—	—	—	—	—	—	—	—	—	
25×40	S2	—	—	6800	2.7	4700	2.8	3300	2.3	2200	1.9	1500	1.6	1000	1.4	
25×45	S2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
25×50	S2	—	—	10000	3.0	6800	2.6	4700	2.4	3300	2.0	2200	2.0	1500	1.8	
30×25	S3	6800	2.6	4700	2.2	3300	2.3	2200	1.9	1500	1.6	1000	1.3	680	1.1	
30×30	S3	10000	3.3	6800	2.7	4700	2.8	3300	2.4	2200	1.9	1500	1.6	1000	1.4	
30×35	S3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
30×40	S3	—	—	10000	3.1	6800	2.7	4700	2.4	3300	2.1	2200	2.1	1500	1.8	
30×45	S3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
30×50	S3	—	—	—	—	10000	3.4	6800	3.1	4700	2.6	3300	2.2	2200	1.8	
35×25	S4	10000	3.4	6800	2.8	4700	2.9	3300	2.4	2200	2.0	1500	1.7	1000	1.5	
35×30	S4	—	—	10000	3.1	6800	2.7	4700	2.5	3300	2.1	2200	2.1	1500	1.8	
35×35	S4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
35×40	S4	—	—	—	—	10000	3.5	6800	3.1	4700	2.6	3300	2.2	2200	1.8	
35×45	S4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
35×50	S4	—	—	—	—	—	—	—	—	6800	3.3	4700	2.7	—	—	

(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.

## 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)

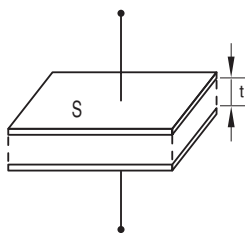


Fig.1-1

C, called the capacitance of capacitor, is expressed by the following expression with the electrode area  $S[m^2]$ , the electrode spacing  $t[m]$  and the dielectric constant of dielectric “ $\epsilon$ ”:

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

$\epsilon_0$  : Dielectric constant in vacuum ( $=8.85 \times 10^{-12} F/m$ )

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.

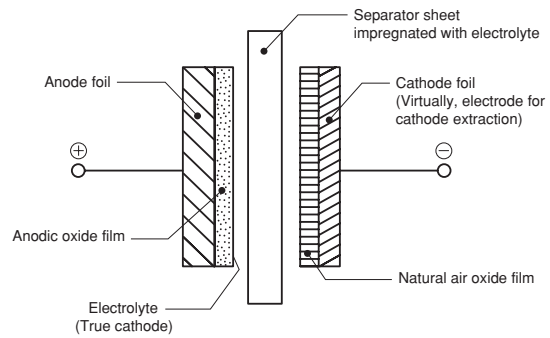
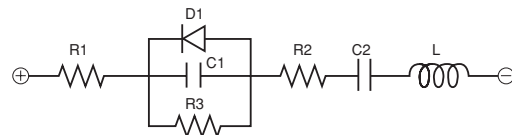


Fig.1-2

### 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

$L_0$  : Life at temperature  $T_0$

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 :

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

Where I : Ripple current (Arms)

R : ESR (Ω)

With increase in the temperature of the capacitor:

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

Where ΔT : Temperature increase in the capacitor core(deg.)

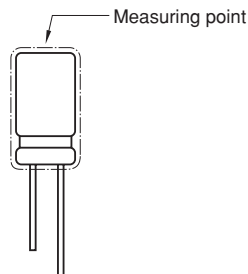
I : Ripple current (Arms)

R : ESR (Ω)

A : Surface area of the capacitor (cm<sup>2</sup>)

H : Radiation coefficient (Approx. 1.5 ~2.0 × 10<sup>-3</sup>W/cm<sup>2</sup>×°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 ΔT varies depending on the capacitor types and operating conditions. The usage is generally desirable if ΔT remains less than 5°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<sub>d</sub> : Life at DC operation (h)

K : Ripple acceleration factor  
(K=2, within allowable ripple current)

T<sub>0</sub> : Upper category temperature (°C)

T : Operating temperature (°C)

ΔT : 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 :

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

Where L<sub>r</sub> : Life at the upper category temperature with the rated ripple current (h)

ΔT<sub>0</sub> : 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<sub>0</sub> : Rated ripple current at the upper category temperature (Arms)

I : Applied ripple current (Arms)

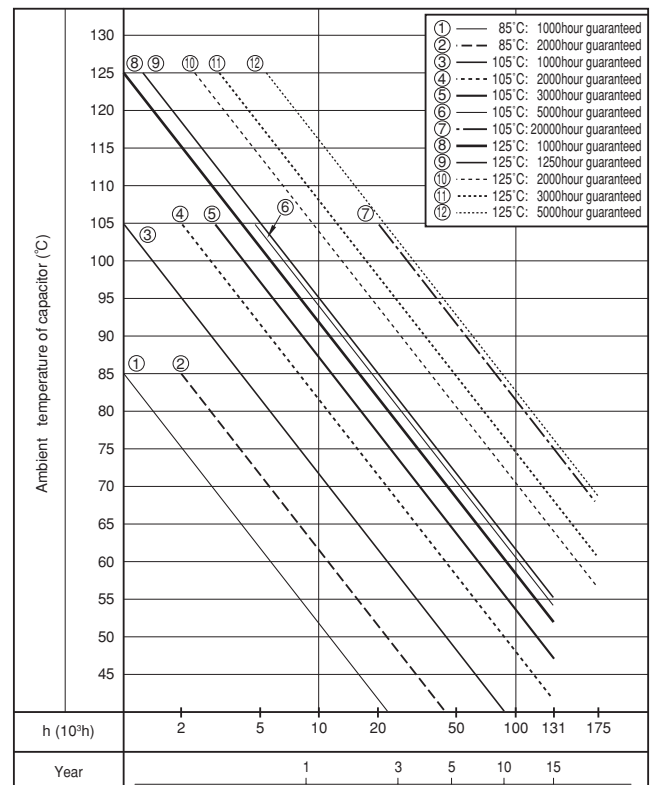
Since it is actually difficult to measure the temperature increase at the capacitor core, the following table is provided for conversion from the surface temperature increase to the core temperature increase.

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°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.

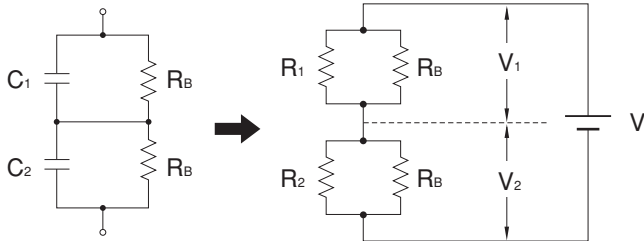
(Table 2-1 Life Expectancy Chart)



### 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.

$$V_1 \left[ \frac{1}{R_1} + \frac{1}{R_B} \right] = V_2 \left[ \frac{1}{R_2} + \frac{1}{R_B} \right] \quad (2)$$

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 High reliability capacitors has the polarization resistance higher than that of the conventional capacitors owing to corrosion inhibition.

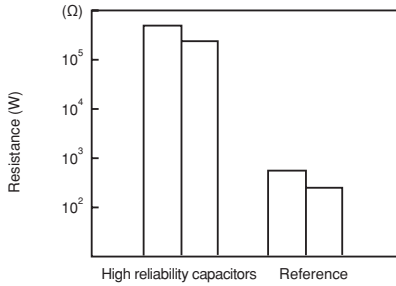


Fig. 3-1

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 High reliability 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.

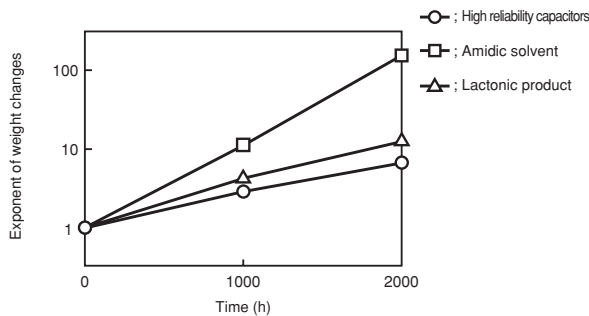


Fig. 3-2

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 High reliability 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 High reliability capacitor.

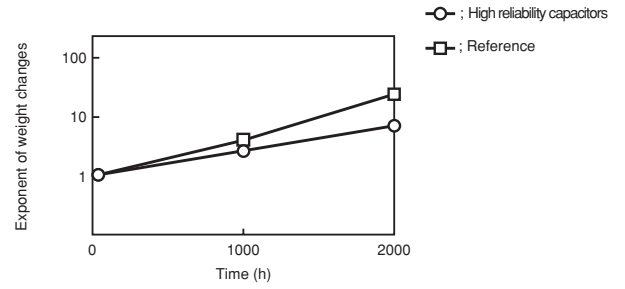


Fig. 3-3

5-4 Long-time stability of electrolyte

The electrolyte used in the High reliability 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.

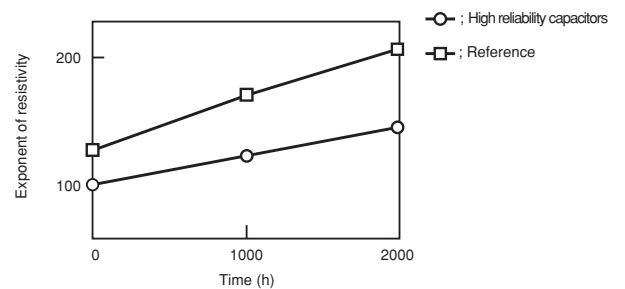


Fig. 3-4

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.

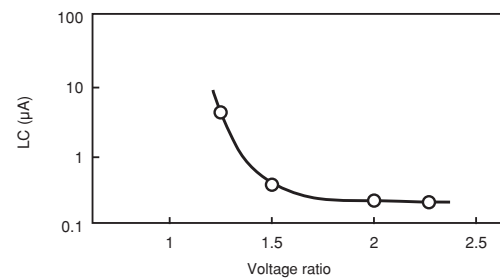


Fig. 3-5

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

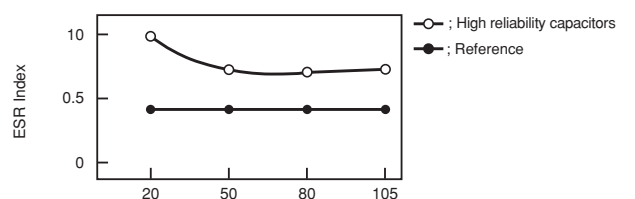
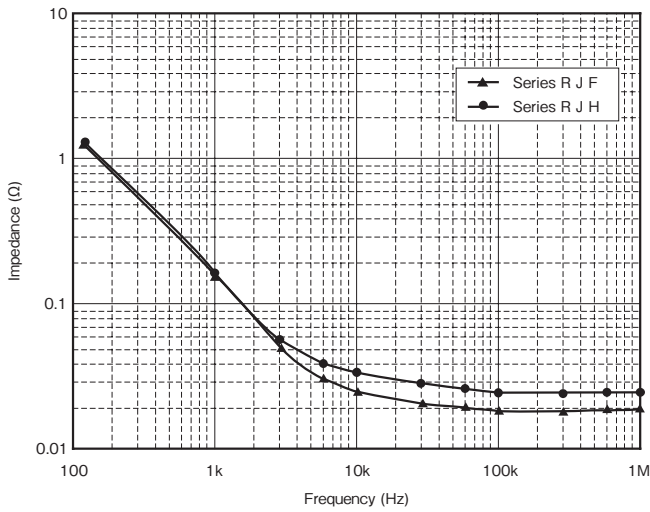


Fig. 3-6 ESR Index of Anode Foil

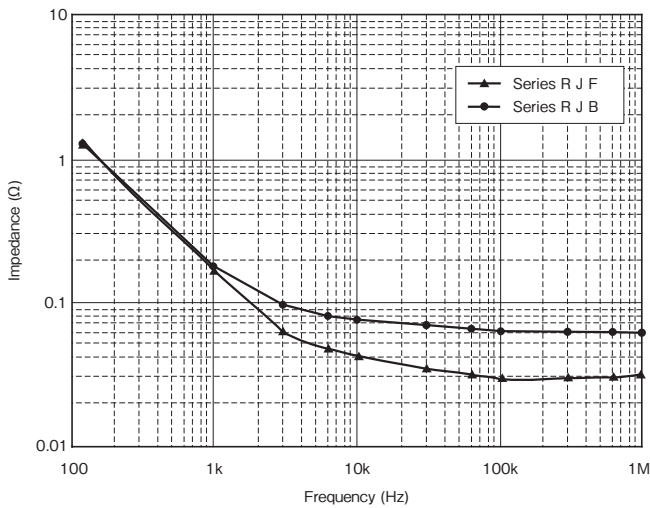
### 6. Electric Characteristics Data

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

#### Frequency characteristics at 20°C

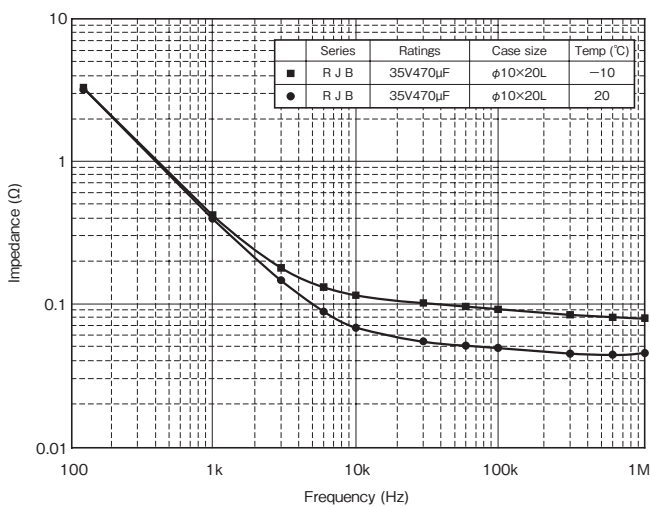


Performanse	Series	R J F	R J H
Rated Voltage		25V	25V
Capacitance		1000 $\mu$ F	1000 $\mu$ F
Size ( $\phi$ ×L)		12.5×20	12.5×25
Impedance Spec. (20°C, 100kHz)		0.021 $\Omega$	0.034 $\Omega$



Performanse	Series	R J F	R J B
Rated Voltage		10V	10V
Capacitance		1000 $\mu$ F	1000 $\mu$ F
Size ( $\phi$ ×L)		10×16	10×16
Impedance Spec. (20°C, 100kHz)		0.038 $\Omega$	0.080 $\Omega$

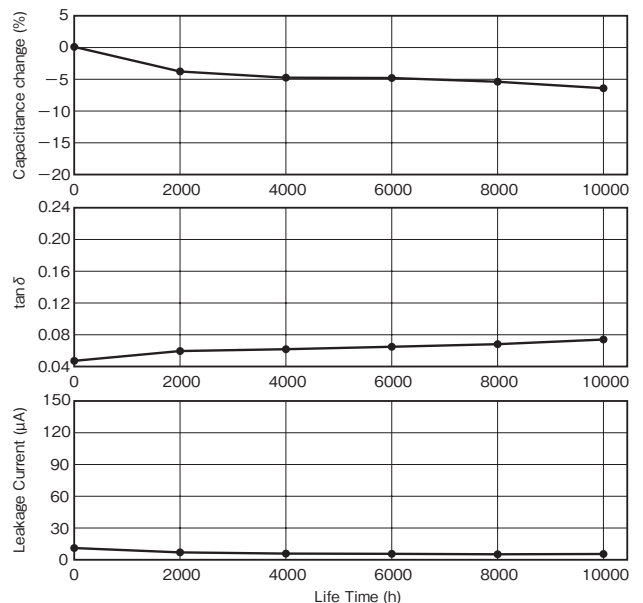
#### Frequency characteristics at 20°C, -10°C



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

##### Series R J B

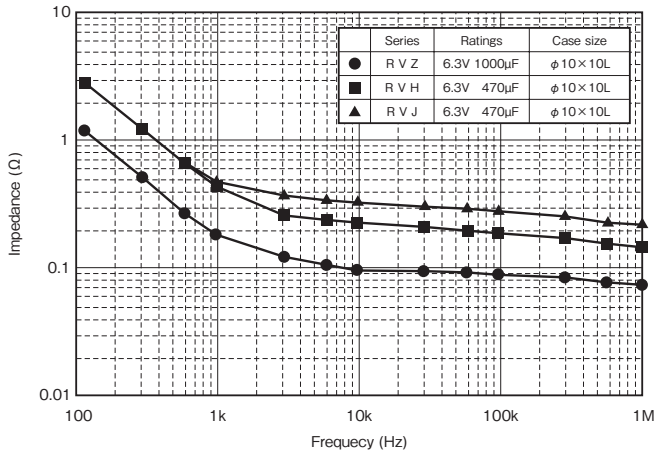
$\phi$ 10×20L 35V470 $\mu$ F 1440mA rms/100kHz n=10



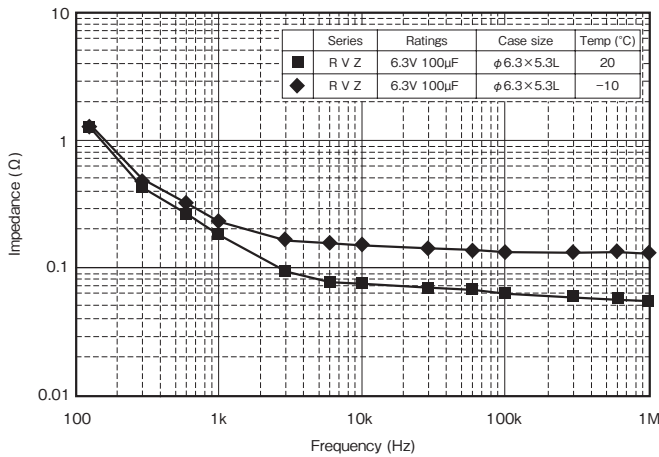
Notice : The mesurment values are not guaranteed values, but measurements.

**6-2 Series RVZ**

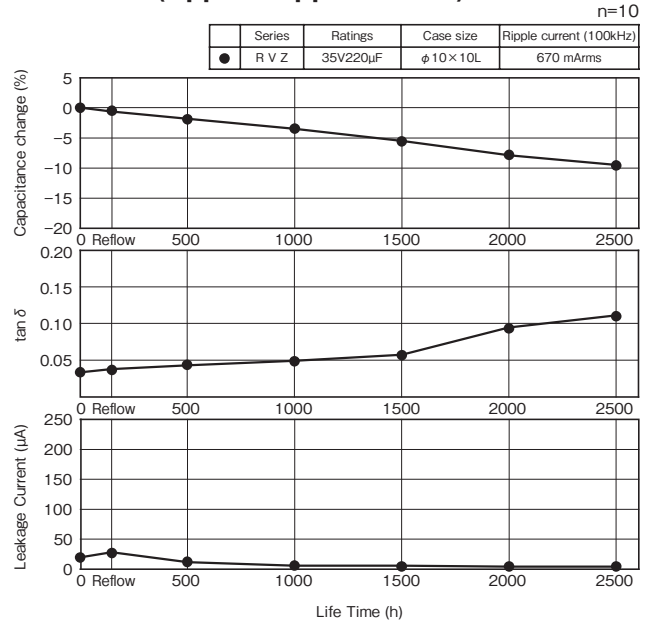
**Frequency characteristics at 20°C**



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

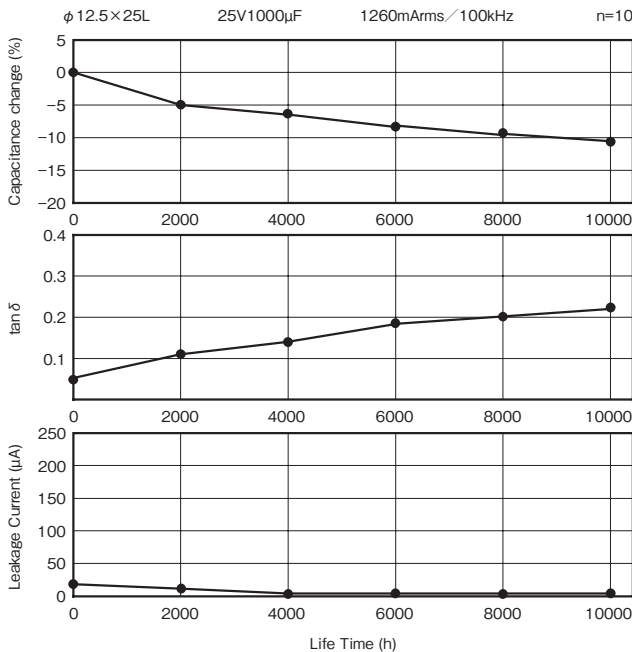


**Endurance (Applied ripple current) at 105°C**

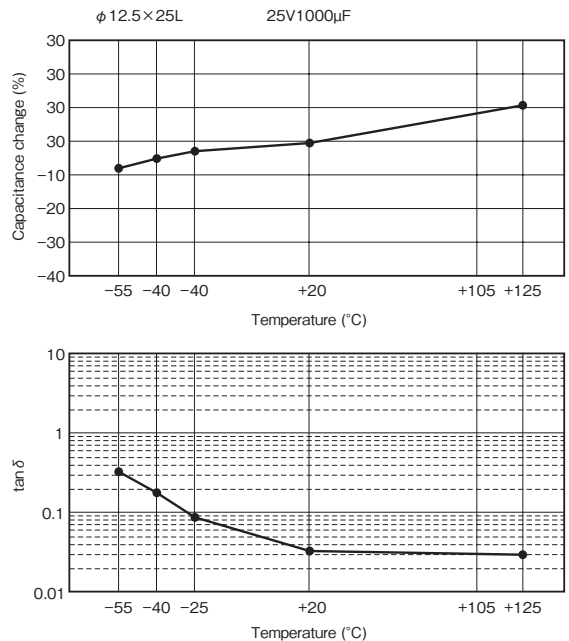


**6-3 Series RK**

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



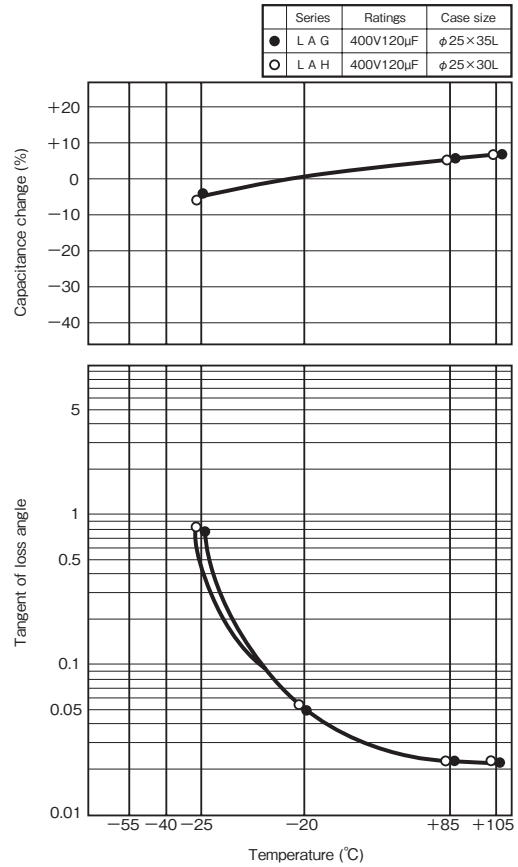
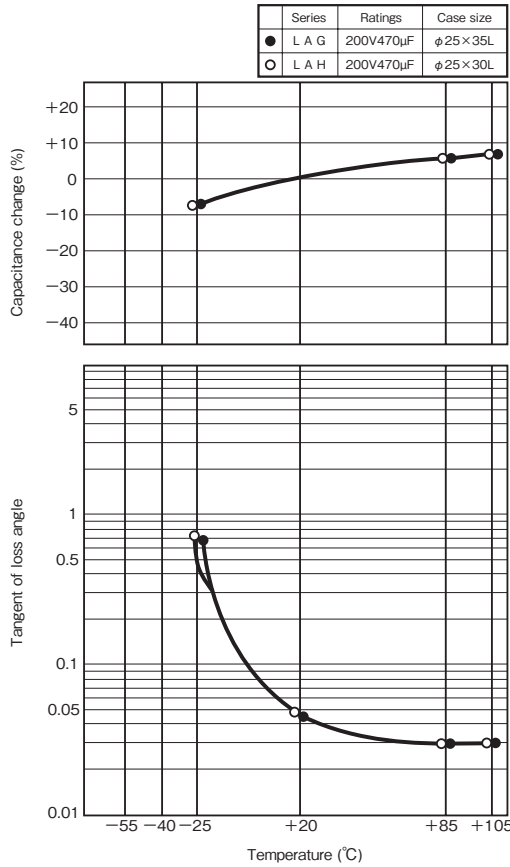
**Temperature Characteristics**



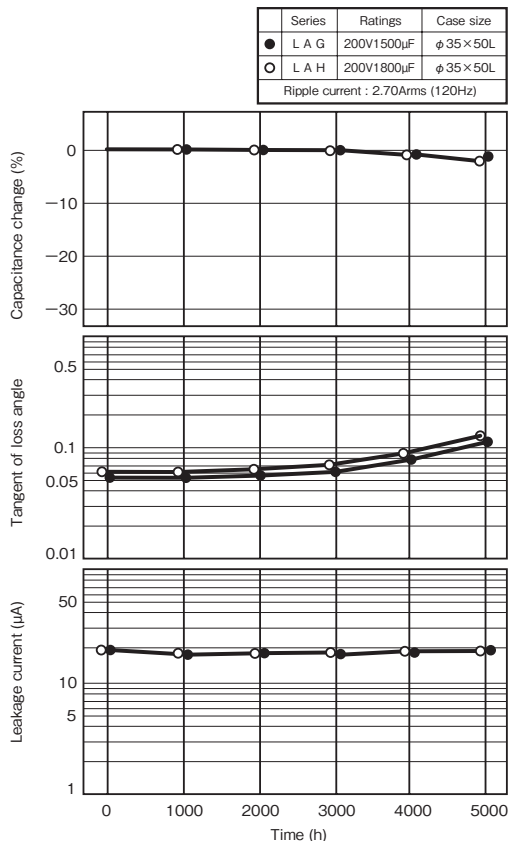
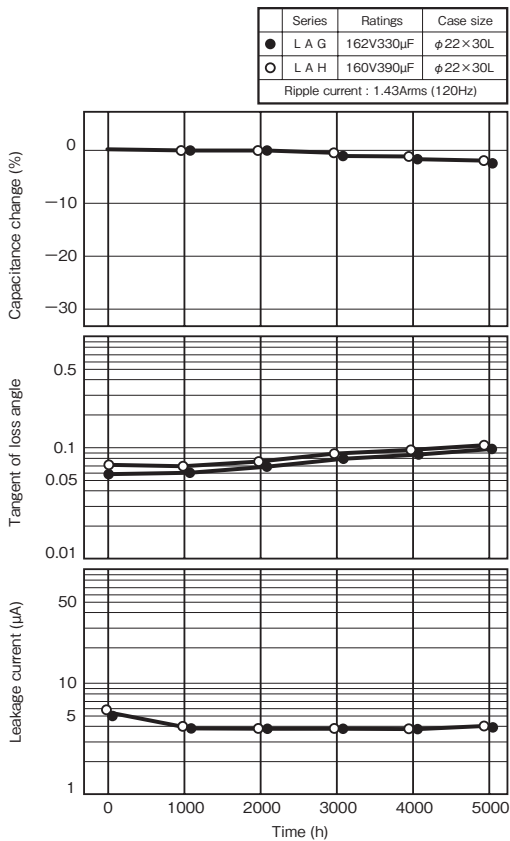
Notice : The mesurment values are not guaranteed values, but measurements.

### 6-4 Series LAG · LAH

#### Temperature characteristics, Series LAG · LAH



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



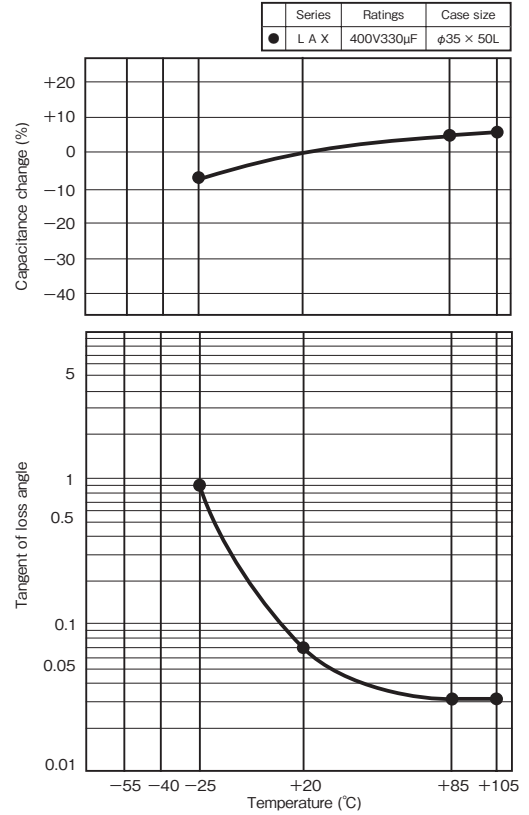
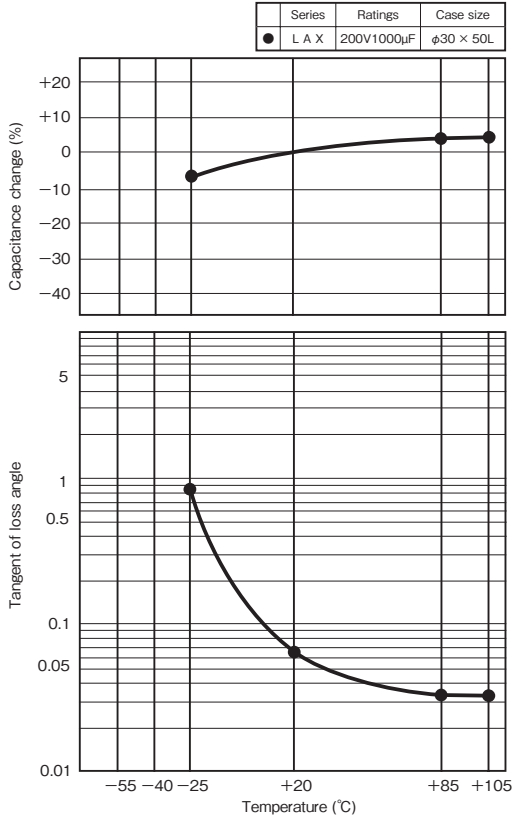
Notice : The mesurment values are not guaranteed values, but measurements.

**NOTE**

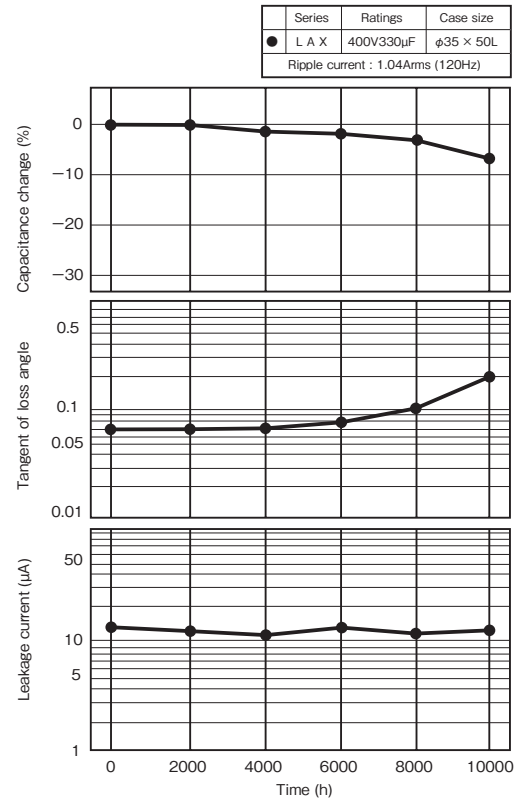
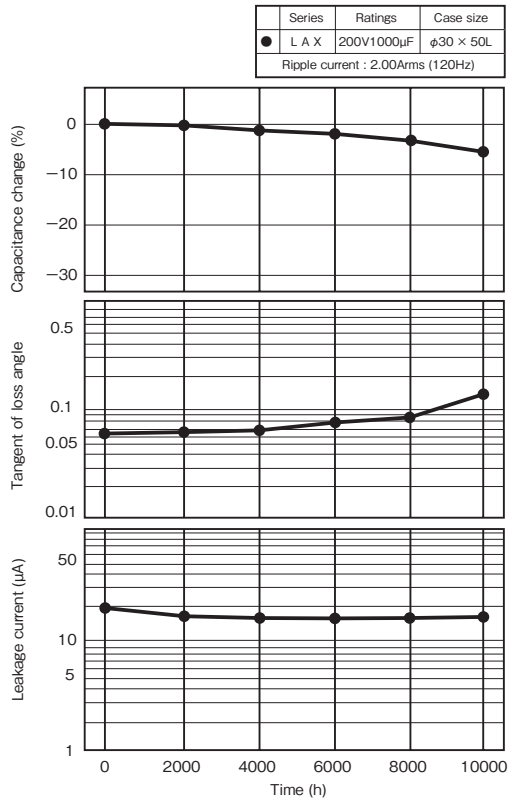
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.

**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.

# ELNA<sup>®</sup>

## Electric Double Layer Capacitors “DYNACAP”, “POWERCAP”

### List of Contents

1. Type List and Systematized Classification for Electric Double Layer Capacitors .....	124
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7. Technical data for Electric Double Layer Capacitors .....	146

# 2

★ : New series  
☆ : Upgrade

■ Type List for DYNACAP

Category	Series	Category temp. range °C		Max.operating voltage V.DC	Capacitance range F	Color of sleeve	Page	Applications	Remarks
		Max.	Min.						
For memory backup	Standard type	DB	+70	-25	5.5	0.047 to 1.0	Indigo	130	Ideal for backing up of CMOS IC's, microcomputers, RAM's, RTC's and the like used in VIDEO's, tuners, TV sets, telephone sets, DVD and others.
	Low ESR type	DBN	+70	-25	5.5	0.1	Indigo	130	
	Low profile High temperature type	DBJ	+85	-10	5.5	0.047 to 1.0	Black	131	
	Miniaturized Standard type	DX	+70	-25	5.5	0.047 to 1.0	Indigo	132	Ideal for backing up of CMOS IC's, microcom-puters, RAM's, RTC's and the like used in VIDEO'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	133	Ideal for backing up of CMOS IC's, microcom-puters, RAM's, RTC's and the like used in VIDEO'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	134	Ideal for backing up of Li -batterybacked equipment such as cameras, VIDEO's and telephone sets.
	High temperature type	DH	+85	-25	5.5	0.047 to 1.0	Indigo	135	Ideal for backing up of controls, electronic rice cooking jars, home bakeries and others.
	Coin type	DC <sub>(614)</sub>	+70	-25	2.5	0.2	Silver	136	Ideal for backing up of pager, solar watches, solar calculators, solar remote control units, camaras and the like.
		DCK <sub>(614)</sub>	+60	-10	3.3	0.2			
		DC	+70	-25	2.5	0.22		—	
DCK		+60	-10	3.3	0.22	—			
Reflow soldering Coin type	DSK <sub>(414)</sub>	+70	-10	3.3	0.07	Silver	137	Mountable on board with best suited for mainly memory and time functions as well as memory backup for PDA and DSC.	
	DS <sub>(614)</sub>	+70	-25	2.5	0.2		138		
	DSK <sub>(614)</sub>	+60	-10	3.3	0.2		—		
	DS	+70	-25	2.5	0.22		—		
	DSK	+60	-10	3.3	0.22		—		
For power	Standard type	DZ	+70	-25	2.5	1.0 to 200	Black	139	Ideal for power supplies of LED displays, personal wireless items, backup for power supplies, and the storage battery of solar battery.
	Large capacitance type	DZH	+60	-25	2.5	50 to 300	Black	139	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	140	Ideal for actuator of moters and electromagnetic coil drives.

■ Type List for POWERCAP

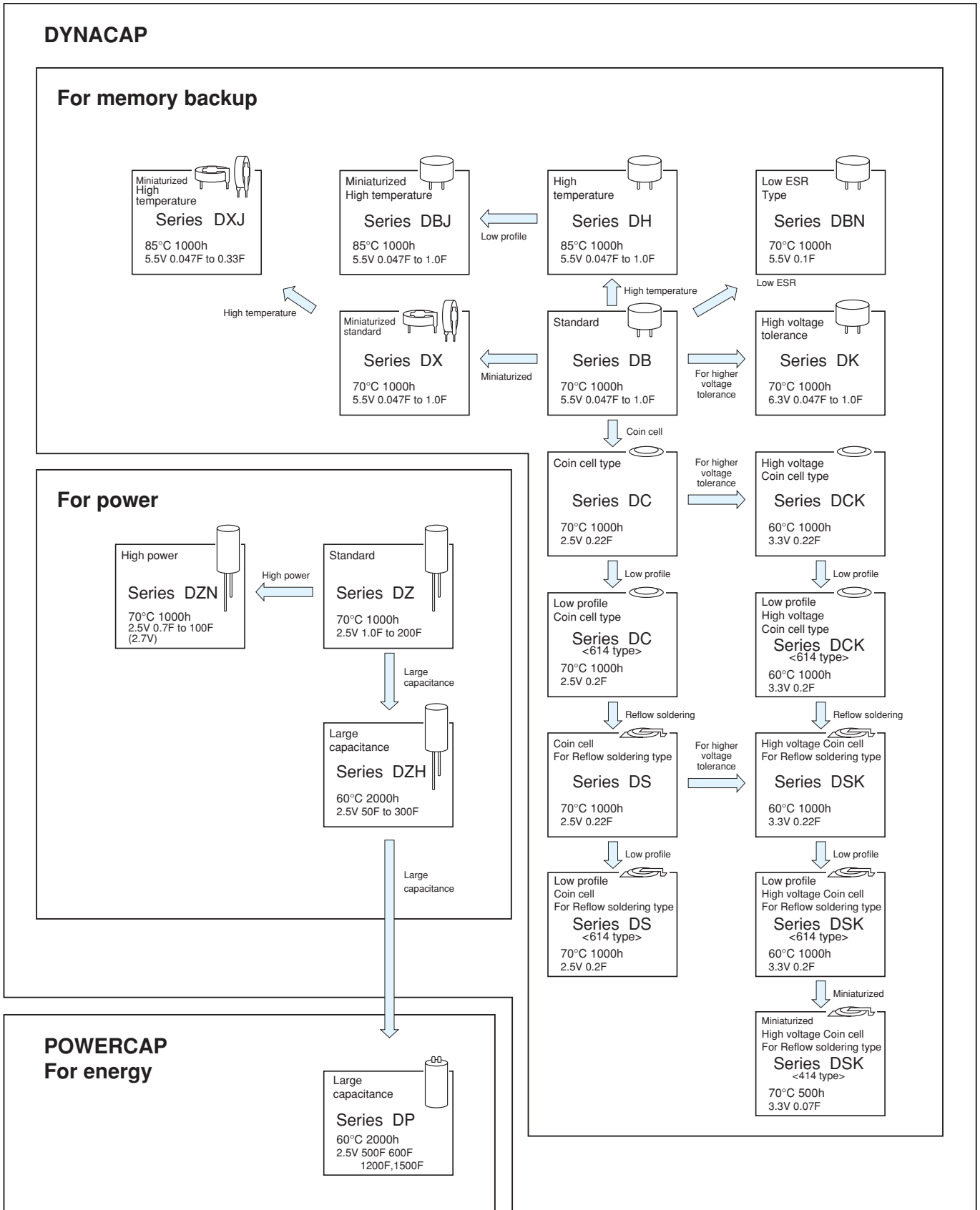
Category	Series	Category temp. range °C		Max.operating voltage V.DC	Capacitance range F	Color of sleeve	Page	Applications	Remarks
		Max.	Min.						
For energy	Large capacitance type	DP	+60	-25	2.5	500, 600 1200, 1500	Black	141	Ideal for power supplies of LED displays, backup for power supplies, the storage battery of solar battery, and actuator of moters and electromagnetic coil drives. ☆

Electric Double Layer Capacitors

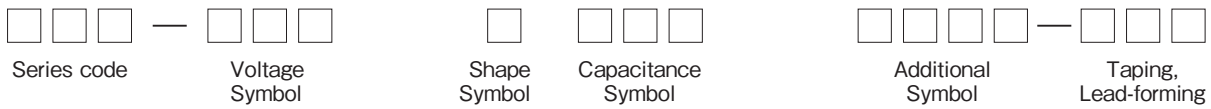
NOTE

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

Systematized Classification of 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.

Max. voltage (V)	Voltage symbol
2.5	2R5
2.7	2R7
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
1200	128

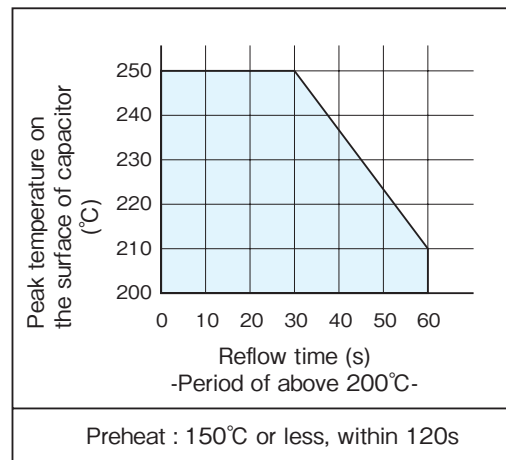
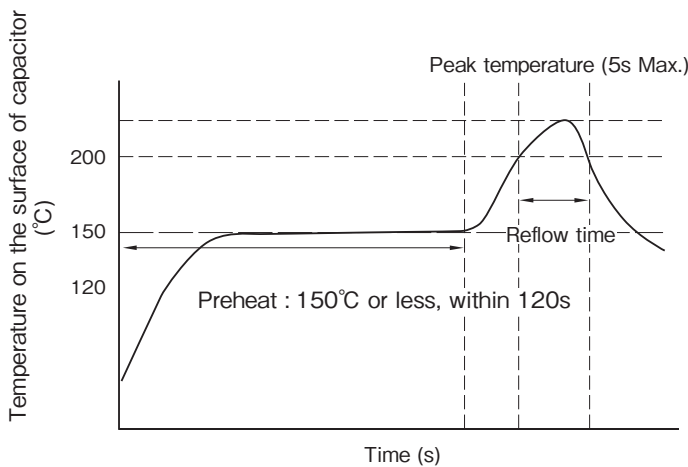
Write down one of the forming symbols for taping and lead-forming capacitors.

When taping or lead-forming is not necessary, leave the boxes blank.

■ 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.

\*Please consult with us about reflow soldering conditions other than the above.

## 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 for the memory backup (DB, DBN, DBJ, DX, DXJ, DXL, DH, DK, DC, DCK, DS, and DSK series) excluding the DZ, DZH, DZN and DP 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.

①The 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.

②If 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, DZH, 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: less than 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 us.

#### 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.

①Avoid high temperature or high humidity or direct rays when storing capacitors.

### NOTE

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

②Keep 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.

③Do not store EDLC at a place where there is a possibility that they may get water, salt or oil spill.

④Do not store EDLC at place where the air contains dense hazardous gas (hydrogen sulfide, sulfuric acid, nitrous acid, chlorine ammonia, etc.).

⑤Do not store EDLC at a place where it gets ultraviolet ray or radioactive ray.

### 13. Capacitors fitted with a relief valve

①The 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.

②For 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°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°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 packing material for sealing and therefore susceptible to excessive heat. Note that the component body temperature shall be controlled so as not to exceed 90°C including preheating.

### 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.

Moreover, the heat influence at the time of soldering can be reduced by floating the body.

### 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°C during work while setting the allowable atmospheric temperature below 110°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.

①Mount 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.

②If 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:

①Appearance : Check if there is leakage.

②Electronic 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.

①Punch a hole or crush the EDLC (to prevent explosion) before incineration at approved facility.

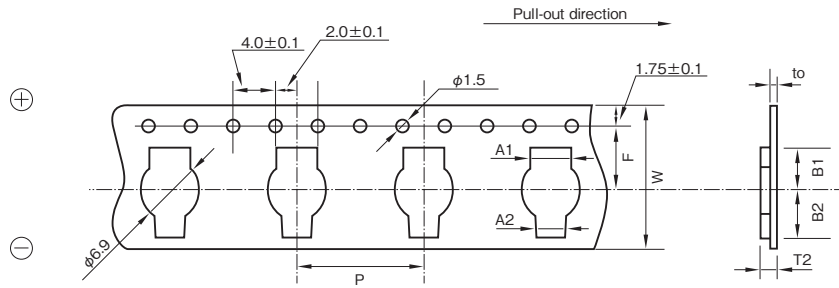
②If they are not to be incinerated, bring them to a professional industrial waste disposal company.

### 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

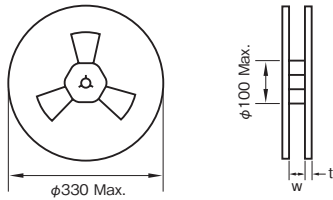
■ Carrier tape dimensions (Series DS, DSK) polarity L



(Unit : mm)

Ourside size	W	P	F	A1	A2	B1	B2	T2	to	φD
φ6.8×1.4~2.1L	24±0.2	12.0	11.5	4.4	3.4	5.9	6.5	3.2	0.3	6.9
φ4.8×1.4L (Terminal shaped : HL)	16±0.2	8.0	7.5	2.4	3.6	5.0	5.1	2.45	0.3	4.9
φ4.8×1.4L (Terminal shaped : HR)	↑	↑	↑	3.6	2.4	5.1	5.0	↑	↑	↑

■ Reel dimensions



(Unit : mm)

Ourside size	Real dimension	
	W	t
φ6.8×1.4~2.1L	26	3
φ4.8×1.4L	18	3

■ Packing quantity

Ourside size	Quantity
φ6.8×2.1L	1500PCS.
φ6.8×1.4L	1500PCS.~2000PCS.
φ4.8×1.4L	2000PCS.

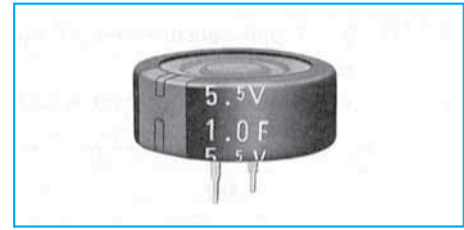
NOTE

Design, Specifications are subject to change without notice.  
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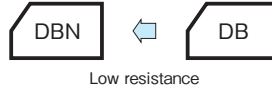
## 5.5V Standard Capacitors Series DB

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) than battery.
- $\phi 13.5 \times 7.5$   $\ell$  size can encase up to 0.33F.
- Ideal for backing up of CMOS's, IC's, microcomputers, RAM's, RTC's and the like used in Video's, tuners, TV sets, telephone sets and others.



Marking color : White print on an indigo sleeve

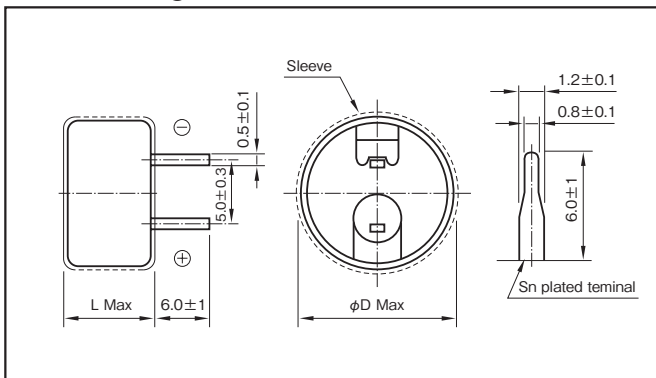


### Specifications

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 ( $\Omega$ )	120	75	75	75	30	30	
Characteristics at high and low temperature	Percentage of capacitance change	Within $\pm 30\%$ 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 $\pm 30\%$ 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.							
Applicable standards	Conforms to JEITA RC-2377 (EIAJ RC-2377)							

### Outline Drawing

Unit : mm



### Standard Ratings

Max. operating voltage (V)	Rated capacitance (F)	ELNA Parts No.	$\phi D \times L$ (mm)
5.5	0.047	DB-5R5D473T	13.5×7.5
5.5	0.1	DB-5R5D104T	13.5×7.5
5.5	0.22	DB-5R5D224T	13.5×7.5
5.5	0.33	DB-5R5D334T	13.5×7.5
5.5	0.47	DB-5R5D474T	21.5×8.0
5.5	1.0	DB-5R5D105T	21.5×8.0

### 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 ( $\Omega$ )	25						
Characteristics at high and low temperature	Percentage of capacitance change	Within $\pm 30\%$ 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 $\pm 30\%$ 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.							
Applicable standards	Conforms to JEITA RC-2377 (EIAJ RC-2377)							

### Standard Ratings

Max. operating voltage (V)	Rated capacitance (F)	ELNA Parts No.	$\phi D \times L$ (mm)
5.5	0.1	DBN-5R5D104T	13.5×7.5

### Part numbering system

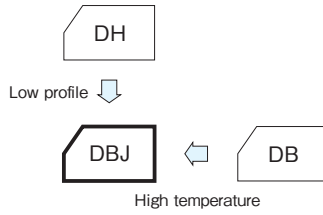
DBN	—	5R5	D	104	T
Series code		Rated voltage symbol		Rated capacitance symbol	

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.
- $\phi 13.5 \times 7.5$  e size can encase up to 0.33F.
- Ideal for backing up of CMOS's, IC's, microcomputers, RAM's, RTC's and the like used in Video's, tuners, TV sets, telephone sets and others.



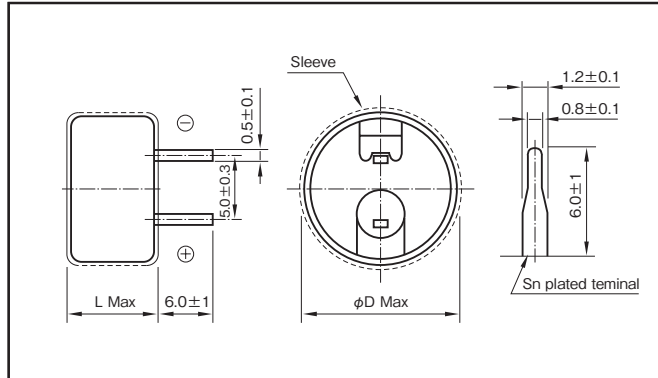
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Specifications

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 ( $\Omega$ )	200	150	150	150	100	75
Characteristics at high and low temperature	Percentage of capacitance change	Within $\pm 30\%$ 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 $\pm 30\%$ 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.						
Applicable standards	Conforms to JEITA RC-2377 (EIAJ RC-2377)						

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.	$\phi D \times L$ (mm)
5.5	0.047	DBJ-5R5D473T	13.5×7.5
5.5	0.1	DBJ-5R5D104T	13.5×7.5
5.5	0.22	DBJ-5R5D224T	13.5×7.5
5.5	0.33	DBJ-5R5D334T	13.5×7.5
5.5	0.47	DBJ-5R5D474T	21.5×8.0
5.5	1.0	DBJ-5R5D105T	21.5×8.0

NOTE

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

## 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 11.5×5mm case.

Miniaturized



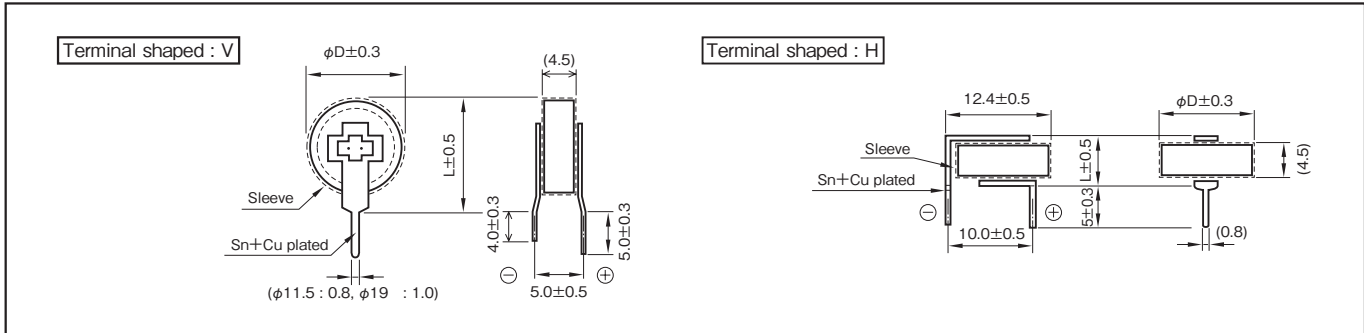
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### Specifications

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.					
Applicable standards	Conforms to JEITA RC-2377 (EIAJ RC-2377)					

### 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.	φDXL (mm)
5.5	0.047	DX-5R5V473U	11.5×13.0
		DX-5R5H473U	11.5× 5.0
5.5	0.1	DX-5R5V104U	11.5×13.0
		DX-5R5H104U	11.5× 5.0
5.5	0.22	DX-5R5V224U	11.5×13.0
		DX-5R5H224U	11.5× 5.0
5.5	0.33	DX-5R5V334U	11.5×13.0
		DX-5R5H334U	11.5× 5.0
5.5	1.0	DX-5R5V105U	19.0×20.5

### NOTE

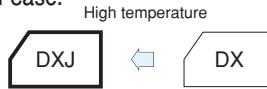
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.

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 11.5×5mm case.



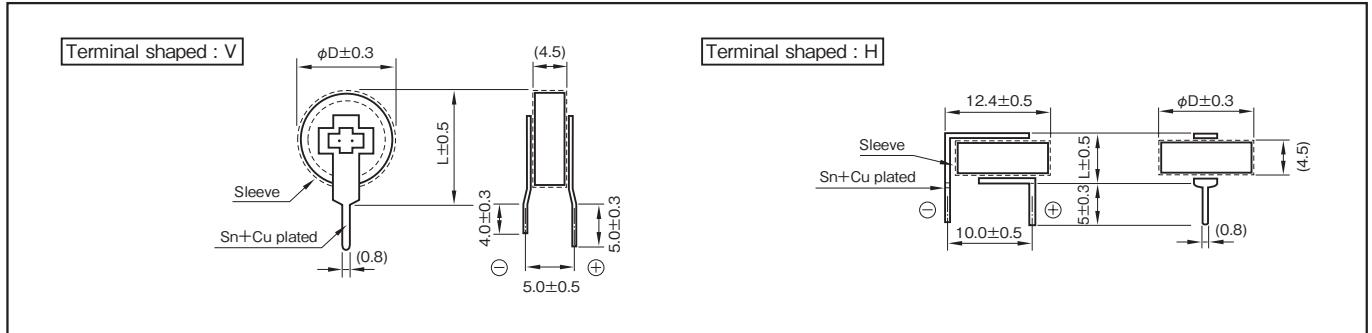
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Specifications

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.				
Applicable standards	Conforms to JEITA RC-2377 (EIAJ RC-2377)				

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.	φD×L (mm)
5.5	0.047	DXJ-5R5V473U	11.5×13.0
		DXJ-5R5H473U	11.5× 5.0
5.5	0.1	DXJ-5R5V104U	11.5×13.0
		DXJ-5R5H104U	11.5× 5.0
5.5	0.22	DXJ-5R5V224U	11.5×13.0
		DXJ-5R5H224U	11.5× 5.0
5.5	0.33	DXJ-5R5V334U	11.5×13.0
		DXJ-5R5H334U	11.5× 5.0

NOTE

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

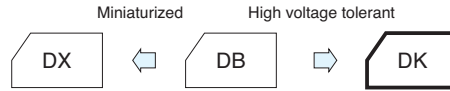
## High Voltage Tolerance Capacitors

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, video and telephone sets.



Marking color : White print on an indigo sleeve

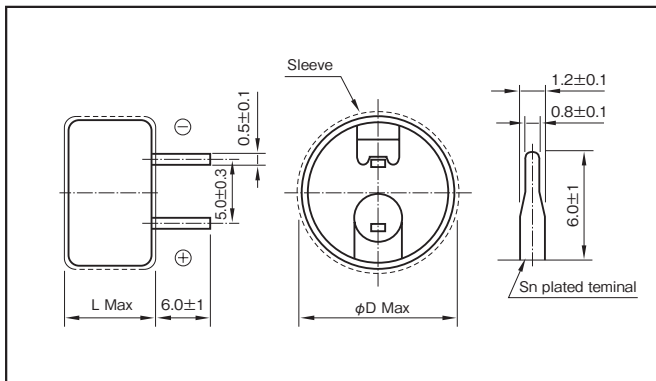


### Specifications

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.					
Applicable standards	Conforms to JEITA RC-2377 (EIAJ RC-2377)					

### 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.	φD×L (mm)
6.3	0.047	DK-6R3D473T	13.5×9.5
6.3	0.1	DK-6R3D104T	13.5×9.5
6.3	0.47	DK-6R3D474T	21.5×9.5
6.3	0.68	DK-6R3D684T	21.5×9.5
6.3	1.0	DK-6R3D105T	21.5×9.5

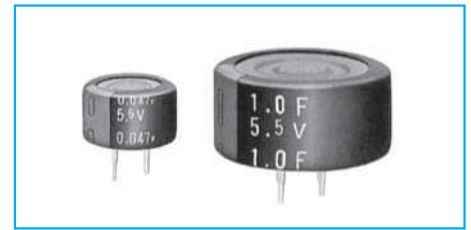
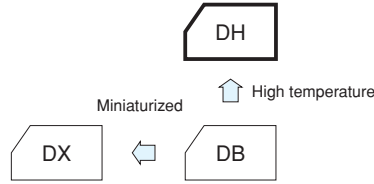
#### NOTE

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

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.



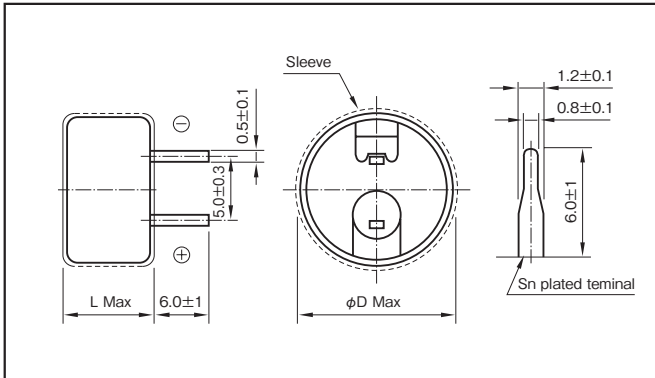
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Specifications

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.							
Applicable standards	Conforms to JEITA RC-2377 (EIAJ RC-2377)							

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.	φD×L (mm)
5.5	0.047	DH-5R5D473T	13.5×9.5
5.5	0.1	DH-5R5D104T	13.5×9.5
5.5	0.22	DH-5R5D224T	13.5×9.5
5.5	0.47	DH-5R5D474T	21.5×9.5
5.5	0.68	DH-5R5D684T	21.5×9.5
5.5	1.0	DH-5R5D105T	21.5×9.5

NOTE

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

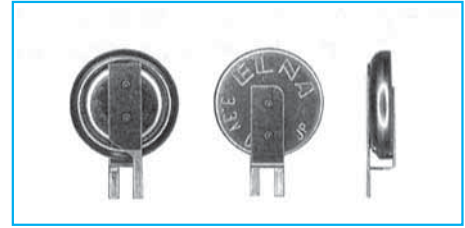
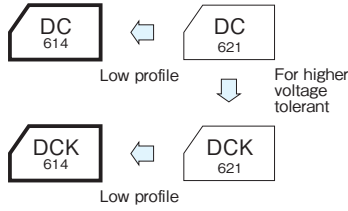
# DC, DCK-614 ELECTRIC DOUBLE LAYER CAPACITORS "DYNACAP"

ELNA®

## 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.

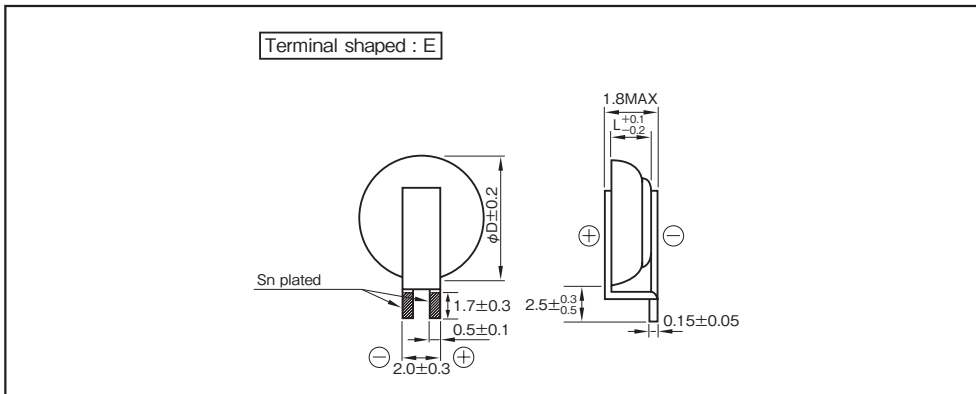


## Specifications

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.			
Applicable standards	Conforms to JEITA RC-2377 (EIAJ RC-2377)			

## 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.	φD×L (mm)
2.5	0.2	DC-2R5E204T614-E	6.8×1.4
3.3	0.2	DCK-3R3E204T614-E	6.8×1.4

### NOTE

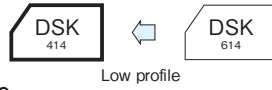
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.

## Coin Cell Capacitors

GREEN CAP

70°C

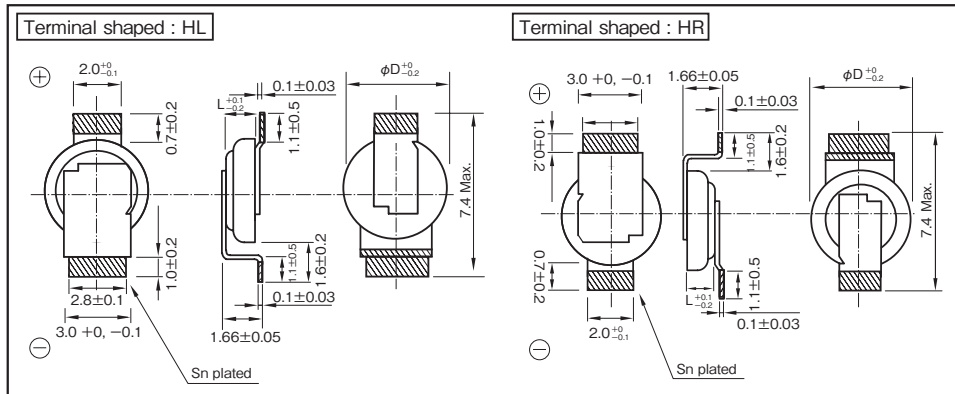
- Reflow soldering method available.
- Unlike batteries, the number of charging / discharging cycles unlimited and rapid charging / discharging is possible.
- Unlike batteries, excellent charge and discharge characteristics with no chemical reactions.
- $\phi 4.8 \times 1.74$ mm Max height type made lineup in the DSK series.



### Specifications

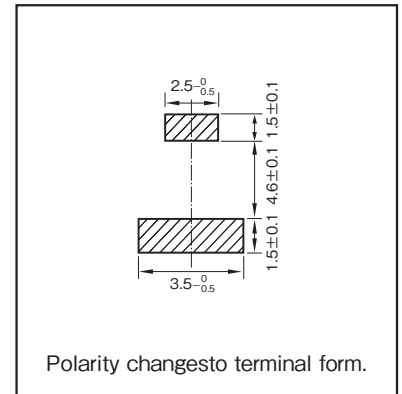
Item	Performance	
Series Name	DSK series	
Rated voltage (V)	3.3	
Category temperature range (°C)	-10 to +70	
Tolerance at rated capacitance (%)	-20 to +80	
Rated Capacitance (F)	0.07	
Internal resistance ( $\Omega$ ) at 1 kHz	100	
Characteristics at high and low temperature	Percentage of capacitance change	Within $\pm 50\%$ 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 $\pm 30\%$ of the initial measured value
	Internal resistance	5k $\Omega$ or less
Shelf life	Test time : 500 hours ; Same as endurance.	
Applicable standards	Conforms to JEITA RC-2377 (EIAJ RC-2377)	

### Outline Drawing



Unit : mm

### Recommended land pattern size



Polarity change to terminal form.

\*Please consult with us about other terminal form

### 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.	$\phi D \times L$ (mm)
3.3	0.07	DSK-3R3H703T414-HLL	4.8×1.4
		DSK-3R3H703T414-HRL	

\*Reflow soldering condition : 126 page.

### NOTE

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

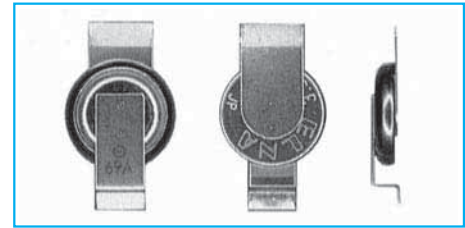
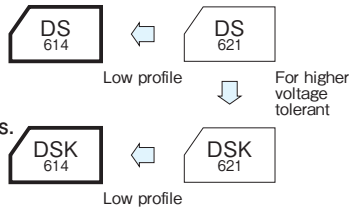
# DS, DSK-614 ELECTRIC DOUBLE LAYER CAPACITORS "DYNACAP"

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.
- Unlike batteries, excellent charge and discharge characteristics with no chemical reactions.
- 1.8mm height type made lineup in the DS, DSK series.

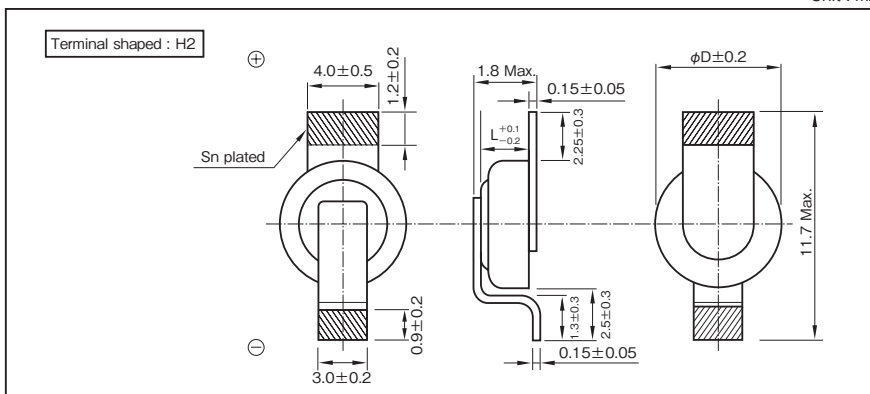


## Specifications

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)	0.2	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.			
Applicable standards	Conforms to JEITA RC-2377 (EIAJ RC-2377)			

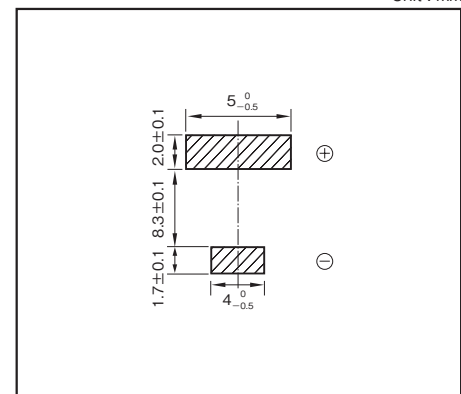
## Outline Drawing

Unit : mm



## Recommended land pattern size

Unit : mm



\* Please consult with us about other terminal form.

## 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

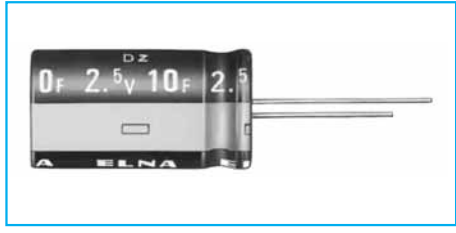
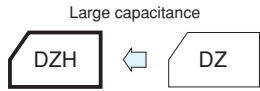
## Standard Ratings

Max. operating voltage (V)	Rated capacitance (F)	ELNA Parts No.	φD×L (mm)
2.5	0.2	DS-2R5H204T614-H2L	6.8×1.4
3.3	0.2	DSK-3R3H204T614-H2L	6.8×1.4

\* Reflow soldering condition : 126 page.

Standard, Large capacitance type Capacitors GREEN CAP 60°C / 70°C

- Pollution-Free ; with no pollutants such as Cd or Pb.
- Unlike batteries ; excellent charge and discharge characteristics with no chemical reactions



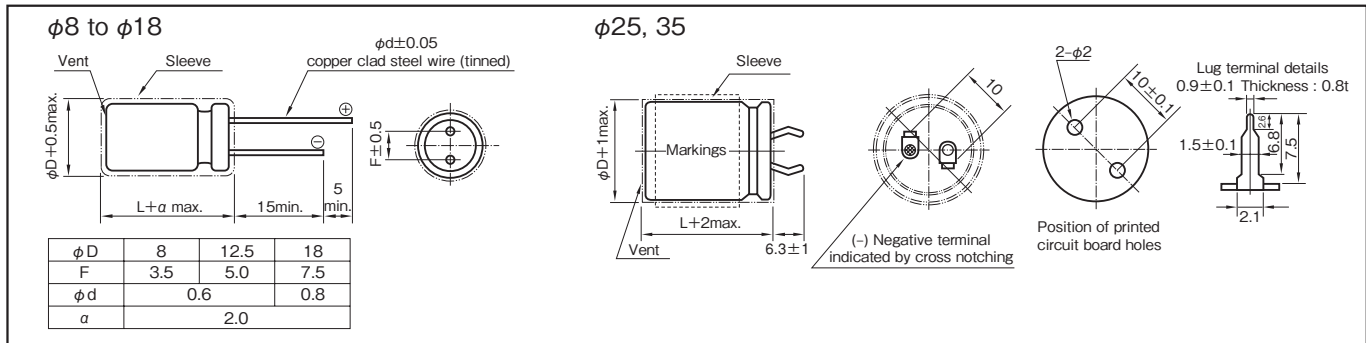
Marking color : White print on a black sleeve

Specifications

Item	Performance	
Series name	Series DZ	Series DZH
Category temperature range (°C)	-25 to +70	-25 to +60
Tolerance at rated capacitance (%)	-20 to +80	-20 to +80
Internal resistance at 1kHz	Rated capacitance (F)	1.0 2.7 3.3 4.7 6.6 10 20 30 50 100 200 300
	Internal resistance (Ω)	1.0 0.5 0.3 0.2 0.2 0.2 0.2 0.2 0.08 0.08 0.08 0.08
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	Test temperature	70°C
	Test time	1000 hours
	Percentage of capacitance change	Within ±30% of the initial measured value
	Internal resistance	Less than four times of the initial specified value
Shelf life	Same as endurance	Same as endurance
Applicable standards	Conforms to JEITA RC-2377 (EIAJ RC-2377)	

Outline Drawing

Unit : mm



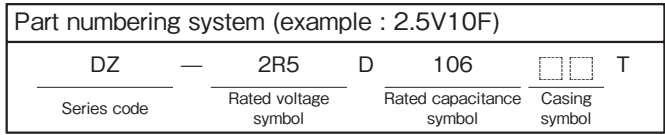
Standard Ratings (Series DZ)

Max. operating voltage (V)	Rated capacitance (F)	Max. Leakage Current (mA) after 24h	ELNA Parts No.	φD×L (mm)	*Internal resistance (mΩ) at 1kHz (measurement value)
2.5	1.0	0.1	DZ-2R5D105G4T	8.0×15.0	300
2.5	1.0	0.1	DZ-2R5D105T	8.0×22.0	200
2.5	2.7	0.2	DZ-2R5D275G5T	8.0×22.0	150
2.5	3.3	0.2	DZ-2R5D335T	12.5×23.0	70
2.5	4.7	0.3	DZ-2R5D475T	12.5×31.5	50
2.5	6.6	0.4	DZ-2R5D665Z6T	12.5×23.0	60
2.5	10	0.5	DZ-2R5D106Z7T	12.5×31.5	50
2.5	10	0.5	DZ-2R5D106T	18.0×35.0	30
2.5	20	0.8	DZ-2R5D206K8T	18.0×35.0	30
2.5	20	0.8	DZ-2R5D206T	18.0×40.0	30
2.5	30	0.8	DZ-2R5D306K9T	18.0×40.0	30
2.5	50	1.0	DZ-2R5D506T	25.0×40.0	30
2.5	100	1.0	DZ-2R5D107S37T	25.0×50.0	20
2.5	100	1.0	DZ-2R5D107T	35.0×50.0	20
2.5	200	2.0	DZ-2R5D207S57T	35.0×50.0	20

Standard Ratings (Series DZH)

Max. operating voltage (V)	Rated capacitance (F)	Max. Leakage Current (mA) after 24h	ELNA Parts No.	φD×L (mm)	*Internal resistance (mΩ) at 1kHz (measurement value)
2.5	50	1.0	DZH-2R5D506K9T	18.0×40.0	30
2.5	100	2.0	DZH-2R5D107S35T	25.0×40.0	20
2.5	300	5.0	DZH-2R5D307S57T	35.0×50.0	20

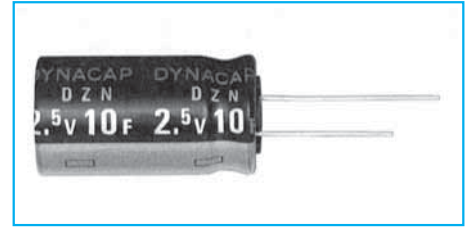
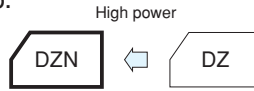
\*Internal resistance are not guaranteed values, but measurement value.  
We tailor packaged product in series and parallel arrangements according to voltage and capacitance as required.



## 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.
- Unlike batteries, excellent charge and discharge characteristics with no chemical renction



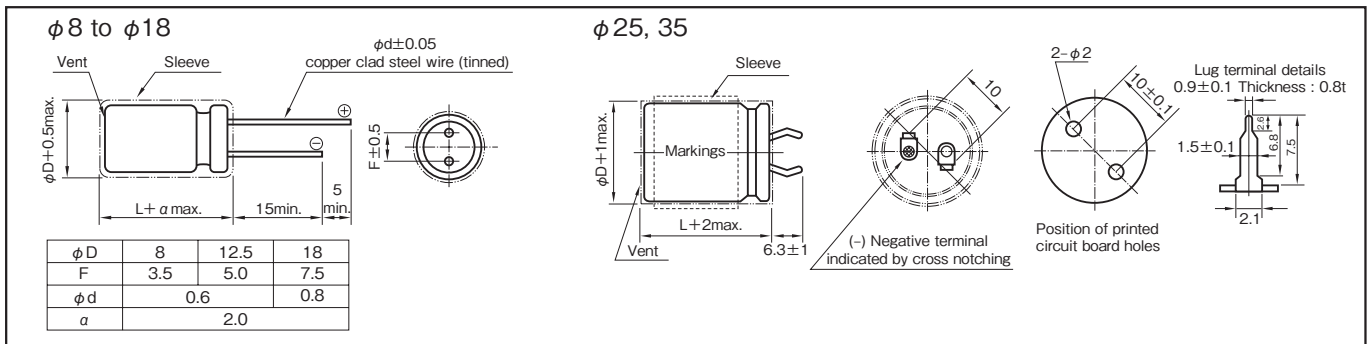
Marking color : White print on a blue sleeve

### 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.	
Applicable standards	Conforms to JEITA RC-2377 (EIAJ RC-2377)	

### Outline Drawing

Unit : mm



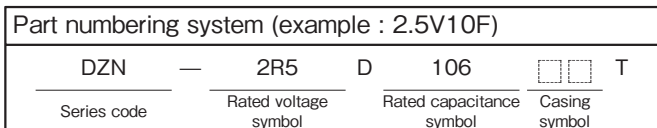
### Standard Ratings (2.5V)

Max. operating voltage (V)	Rated capacitance (F)	Max. Leakage Current (mA) after 24h	ELNA Parts No.	φ D × L (mm)	* Internal resistance (mΩ) at 1kHz (measurement value)
2.5	0.7	0.1	DZN-2R5D704G4T	8.0 × 15.0	200
2.5	1.0	0.1	DZN-2R5D105T	8.0 × 22.0	100
2.5	3.3	0.2	DZN-2R5D335T	12.5 × 23.0	40
2.5	4.7	0.3	DZN-2R5D475T	12.5 × 31.5	30
2.5	10	0.5	DZN-2R5D106T	18.0 × 35.0	20
2.5	20	0.8	DZN-2R5D206T	18.0 × 40.0	20
2.5	50	1.0	DZN-2R5D506T	25.0 × 40.0	15
2.5	100	1.0	DZN-2R5D107T	35.0 × 50.0	8

### Standard Ratings (2.7V)

Max. operating voltage (V)	Rated capacitance (F)	Max. Leakage Current (mA) after 24h	ELNA Parts No.	φ D × L (mm)	* Internal resistance (mΩ) at 1kHz (measurement value)
2.7	1.0	0.2	DZN-2R7D105G5T	8.0 × 22.0	120
2.7	3.3	0.3	DZN-2R7D335Z6T	12.5 × 23.0	50
2.7	4.7	0.4	DZN-2R7D475Z7T	12.5 × 31.5	40
2.7	10	0.6	DZN-2R7D106K8T	18.0 × 35.0	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.



#### NOTE

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

### 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) Series 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.

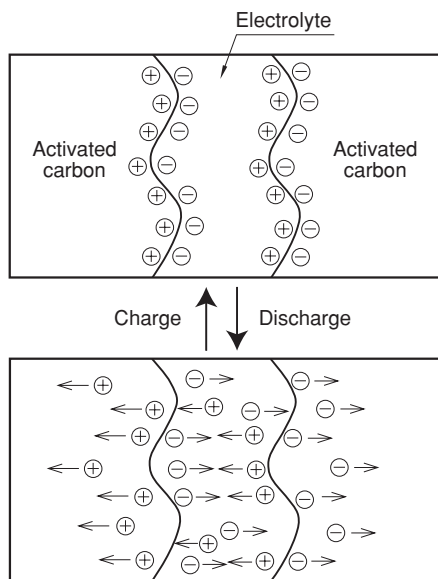


Fig.1 Schematic of Principle of Electric Double Layer Capacitor

Electric Double Layer Capacitors  
TECHNICAL NOTE

**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.

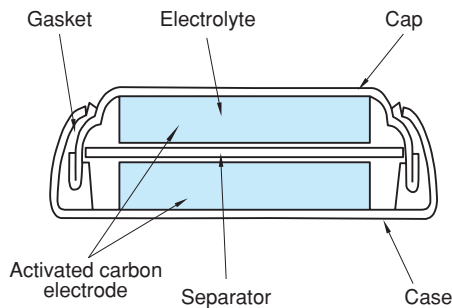


Fig.2 Example of Basic Construction of Coin Cell

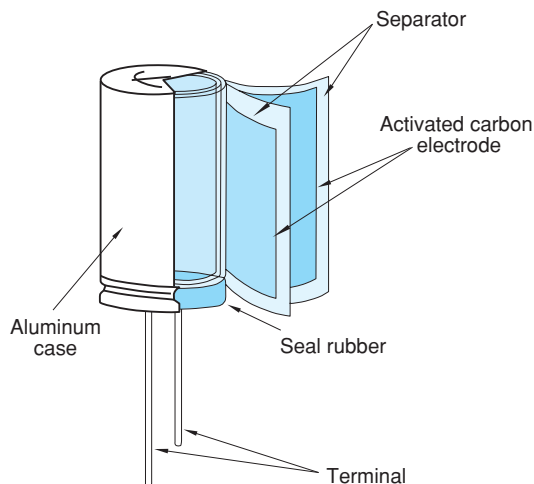


Fig.3 Example of Basic Construction of Cylindrical Cell

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.

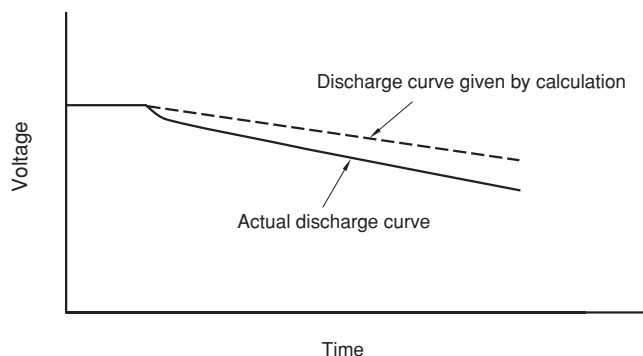


Fig.4 Example of Discharge Curve involving Self-Discharge

#### 3-3 Effect of IR Drop at Large Currents

When a large Current discharge and a capacitor with a high 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 large current is required in a very short time, or a large 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.

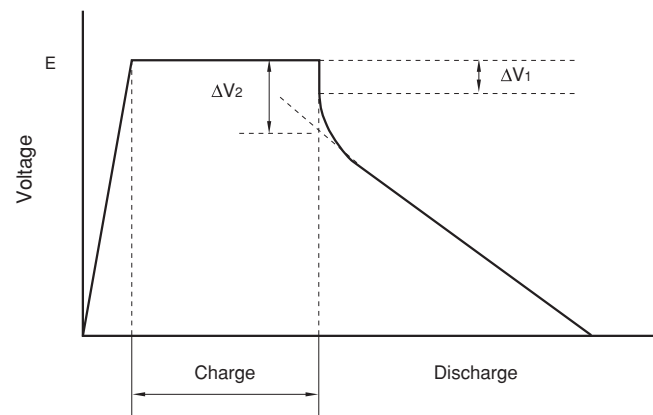


Fig.5 Example of Discharge Curve involving IR Drop

Due to IR drop, the shape of the discharge curve varies by the internal resistance and ambient temperature for each series.

#### NOTE

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

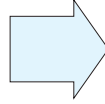
**4 Series-parallel connection packaged products.**

Electric Double Layer Capacitors have a low operating voltage per cell.

To deal with this, ELNA is ready to offer series packaging for high operating voltages to meet to various needs.

Please consult with us on optimization and design.

Packaged item



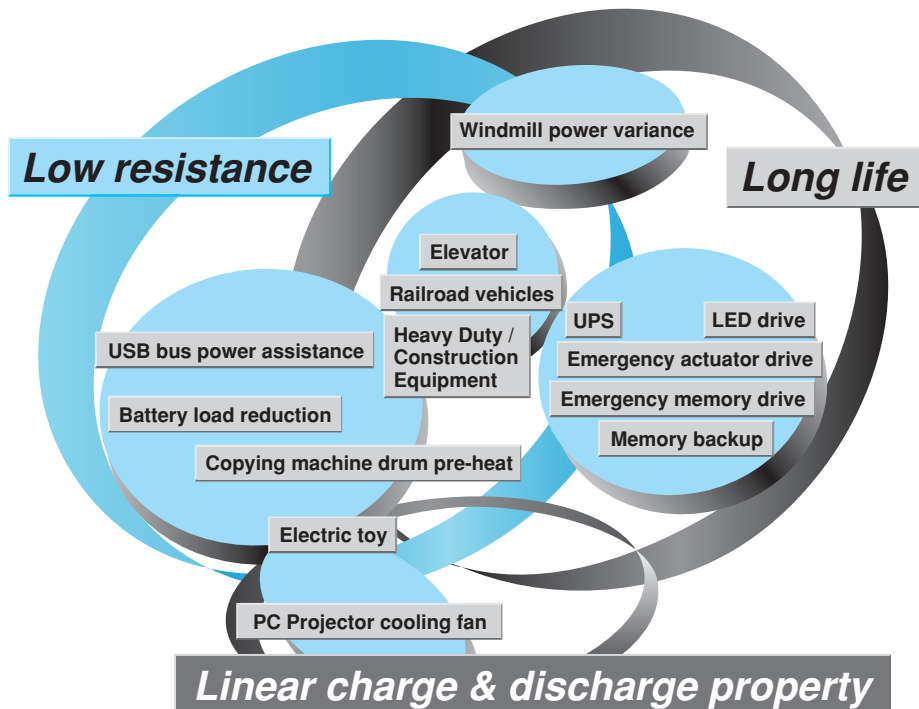
Example of packaged item

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.

**5 Applications**

*Features & Benefits of Electric Double Layer Capacitor*



Electric Double Layer Capacitors  
TECHNICAL NOTE

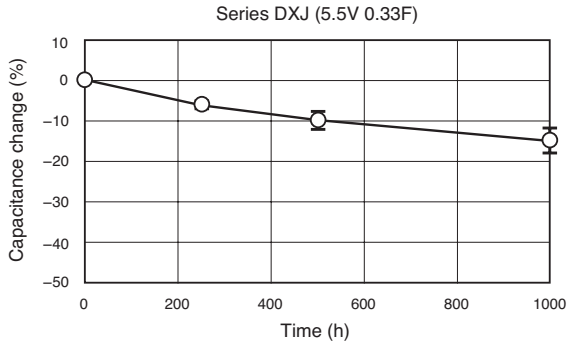
### 6 Electric Characteristics Data

#### 6-1 Coin type for memory back-up

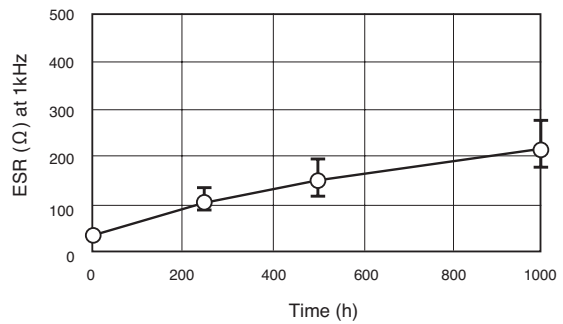
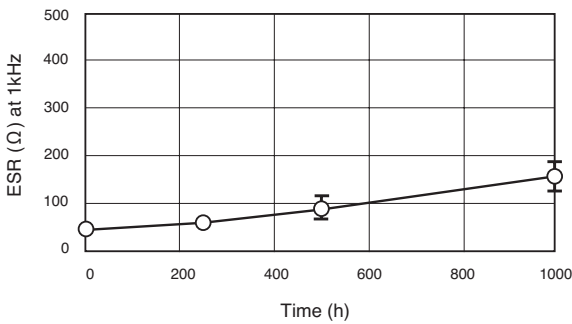
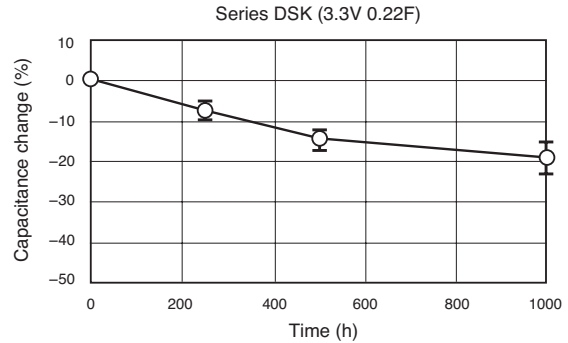
DYNACAP Series DXJ  
5.5V 0.33F/DXJ-5R5H334  $\phi 11.5 \times 5L$  (mm)

DYNACAP Series DSK  
3.3V 0.22F/DSK-3R3H224  $\phi 6.8 \times 2.1L$  (mm)

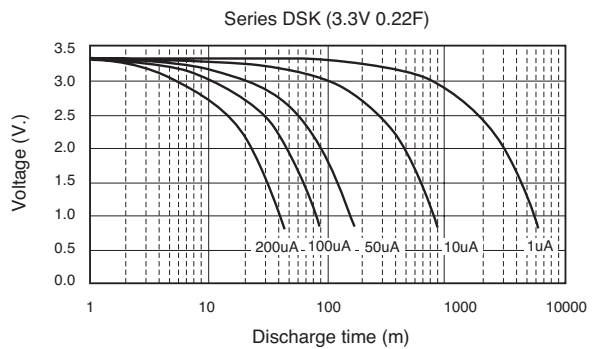
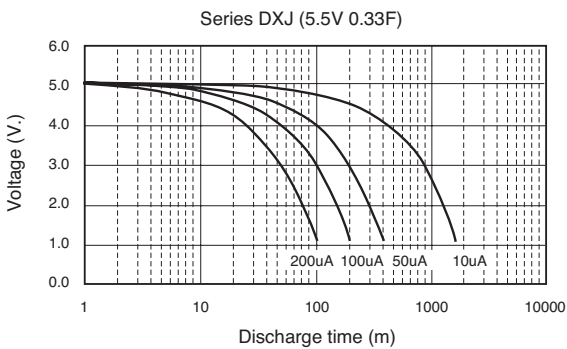
#### ■ Endurance (85°C 5.5V.DC)



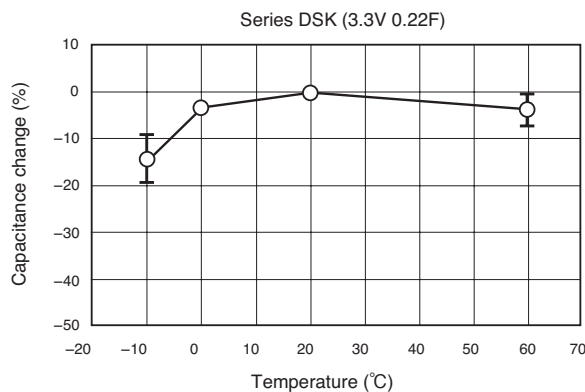
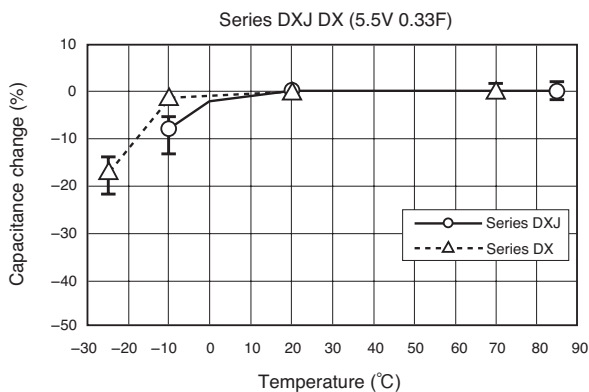
#### ■ Endurance (60°C 3.3V.DC)



#### ■ Discharge characteristics



#### ■ Characteristics at high and low temperature



Electric Double Layer Capacitors TECHNICAL NOTE

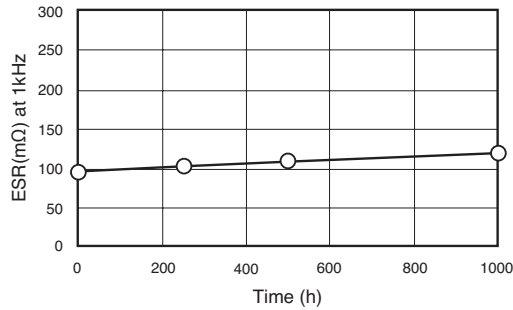
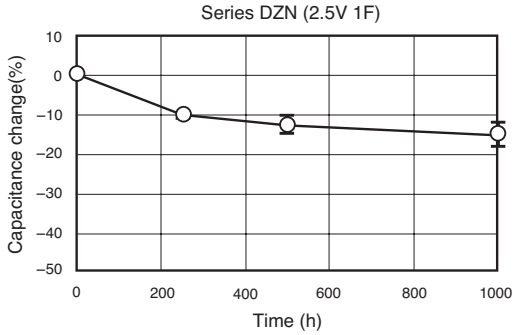
#### NOTE

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6-2 Cylindrical type for power

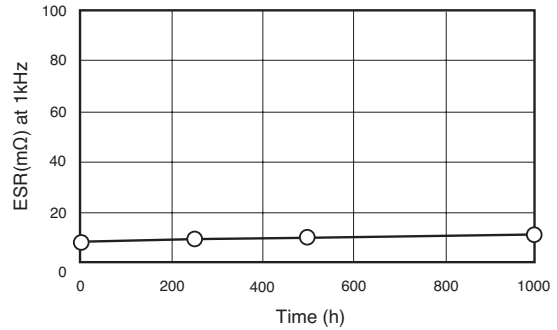
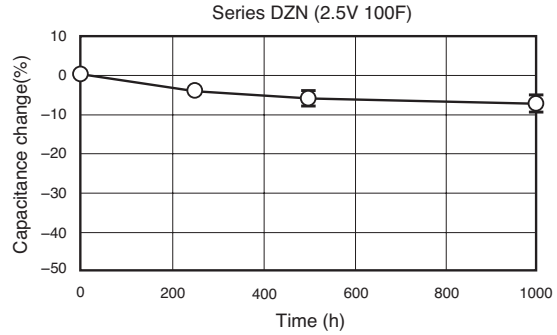
DYNACAP Series DZN  
2.5V 1F/DZN-2R5D105T  $\phi 8 \times 22L$  (mm)

■ Endurance (70°C 2.5V.DC)

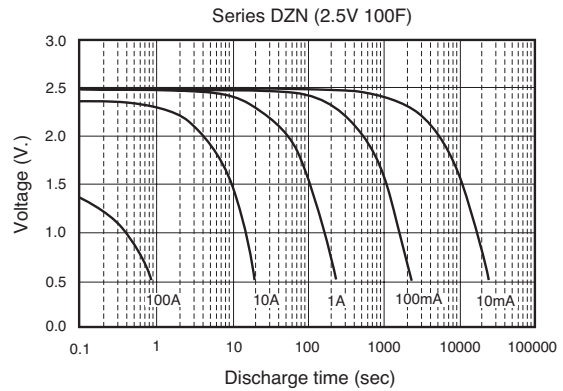
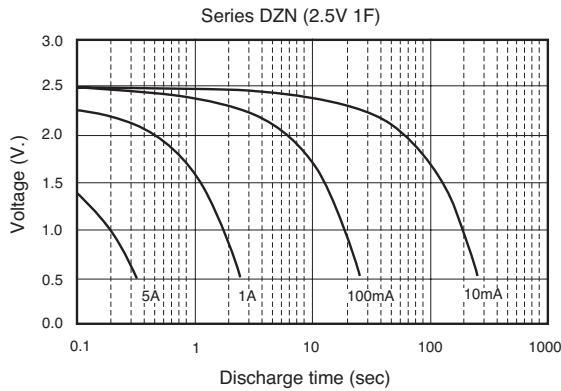


DYNACAP Series DZN  
2.5V 100F/DZN-2R5D107T  $\phi 35 \times 50L$  (mm)

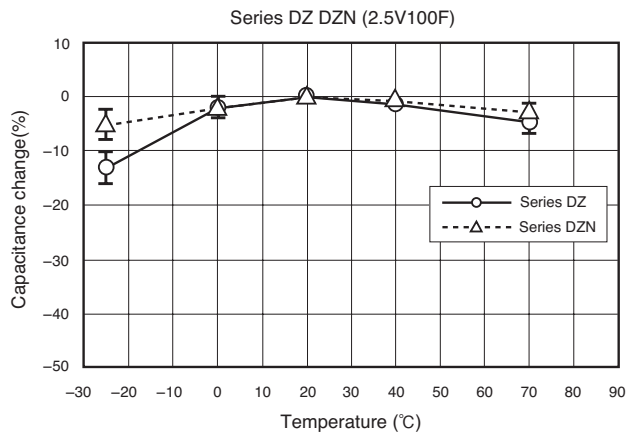
■ Endurance (70°C 2.5V.DC)



■ Discharge characteristics



■ Characteristics at high and low temperature



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