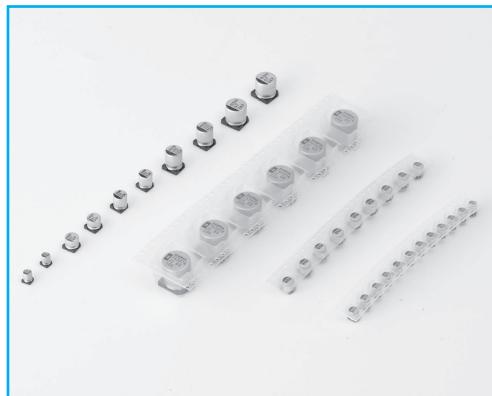


# **4** SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

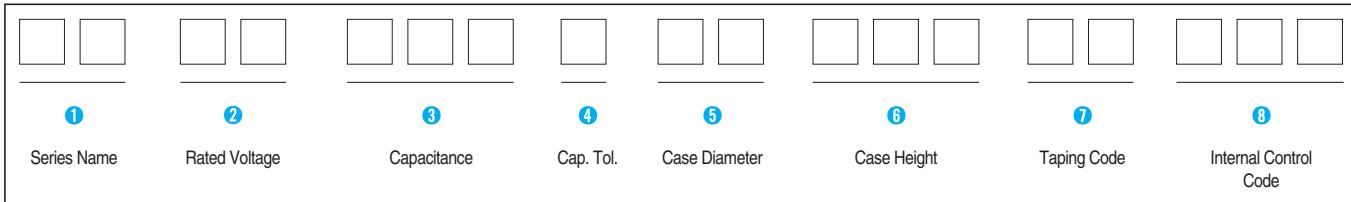
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# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

## PART NUMBER SYSTEM

### Part Number System



#### 1 Series Name

See page 6.

#### 2 Rated Working Voltage

WV	4	6.3	10	16	25	35	50
Code	0G	0J	1A	1C	1E	1V	1H
WV	63	100	160	200	250	400	450
Code	1J	2A	2C	2D	2E	2G	2W

#### 3 Capacitance

ex) 0.47μF	474
4.7μF	475
47μF	476
470μF	477
4700μF	478

#### 4 Capacitance Tolerance

Tolerance (%)	±20
Code	M

#### 5 Case Diameter

ex) Ø4	04
Ø5	05
Ø6.3	6L
Ø8	08
Ø10	10
Ø12.5	12

#### 6 Case Height

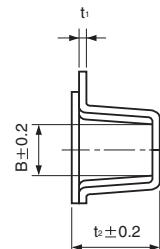
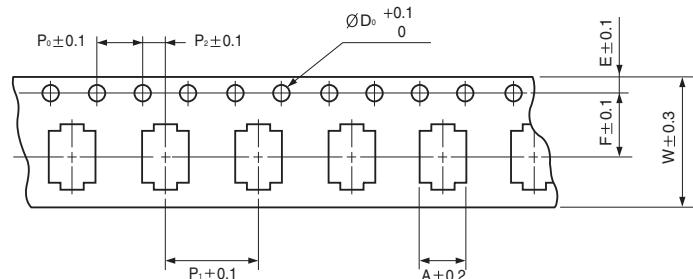
ex)	5.3mm	005
	5.8mm	006
	6.2mm	06B
	7.7mm	07K
	10mm	010
	13.5mm	13M

#### 7 Taping Code VR (Reel Type)

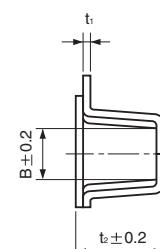
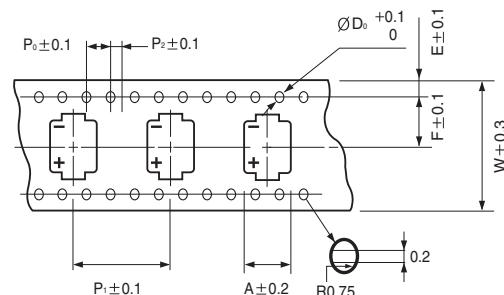
## ● Taping Specifications for Chip Type Capacitors

### ● Carrier Tape

• Fig.1

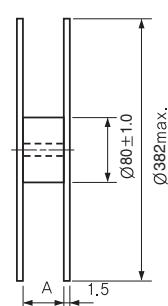
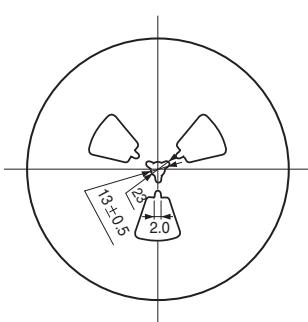


• Fig.2

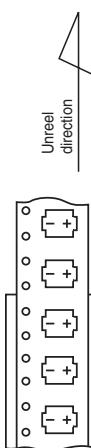


$\varnothing D \times L$	A	B	$\varnothing D_0$	E	F	$P_0$	$P_1$	$P_2$	$t_1$	$t_2$	W	Fig.
4 × 5.3	4.7	4.7	1.5	1.75	5.5	4.0	8.0	2.0	0.4	5.7	12.0	1
5 × 5.3	5.7	5.7	1.5	1.75	5.5	4.0	12.0	2.0	0.4	5.7	12.0	
6.3 × 5.3	7.0	7.0	1.5	1.75	7.5	4.0	12.0	2.0	0.4	5.7	16.0	
6.3 × 5.8	7.0	7.0	1.5	1.75	7.5	4.0	12.0	2.0	0.4	6.3	16.0	
6.3 × 7.7	7.0	7.0	1.5	1.75	7.5	4.0	12.0	2.0	0.4	8.2	16.0	
8 × 6.2	8.7	8.7	1.5	1.75	7.5	4.0	12.0	2.0	0.4	6.8	16.0	
8 × 10	8.7	8.7	1.5	1.75	11.5	4.0	16.0	2.0	0.4	11.0	24.0	
10 × 10	10.7	10.7	1.5	1.75	11.5	4.0	16.0	2.0	0.4	11.0	24.0	
12.5 × 13.5	14.0	14.0	1.5	1.75	14.2	4.0	24.0	2.0	0.5	14.0	32.0	2

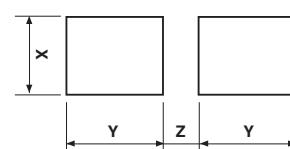
### ● Reel (Taping code : VR)



### ● Polarity



### ● Recommended Land Size



$\varnothing D \times L$	A
4 × 5.3	14
5 × 5.3	14
6.3 × 5.3	18
6.3 × 5.8	18
6.3 × 7.7	18
8 × 6.2	18
8 × 10	26
10 × 10	26
12.5 × 13.5	34

$\varnothing D \times L$	Q'ty/Reel(pcs.)	Q'ty/Box(pcs.)
4 × 5.3	2000	20000
5 × 5.3	1000	10000
6.3 × 5.3	1000	10000
6.3 × 5.8	1000	10000
6.3 × 7.7	900	9000
8 × 6.2	1000	10000
8 × 10	500	3000
10 × 10	500	3000
12.5 × 13.5	200	1000

$\varnothing D \times L$	X	Y	Z
4 × 5.3	1.6	2.6	1.0
5 × 5.3	1.6	3.0	1.4
6.3 × 5.3	1.6	3.5	2.0
6.3 × 5.8	1.6	3.5	2.0
6.3 × 7.7	1.6	3.5	2.0
8 × 6.2	2.5	4.0	2.0
8 × 10	2.5	3.5	3.0
10 × 10	2.5	4.0	4.0
12.5 × 13.5	2.5	5.7	4.0

# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

**SC**

Chip type, Standard  
Series

- Chip type higher capacitance in larger case sizes
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

  
Solvent Proof  
WV ≤ 100V

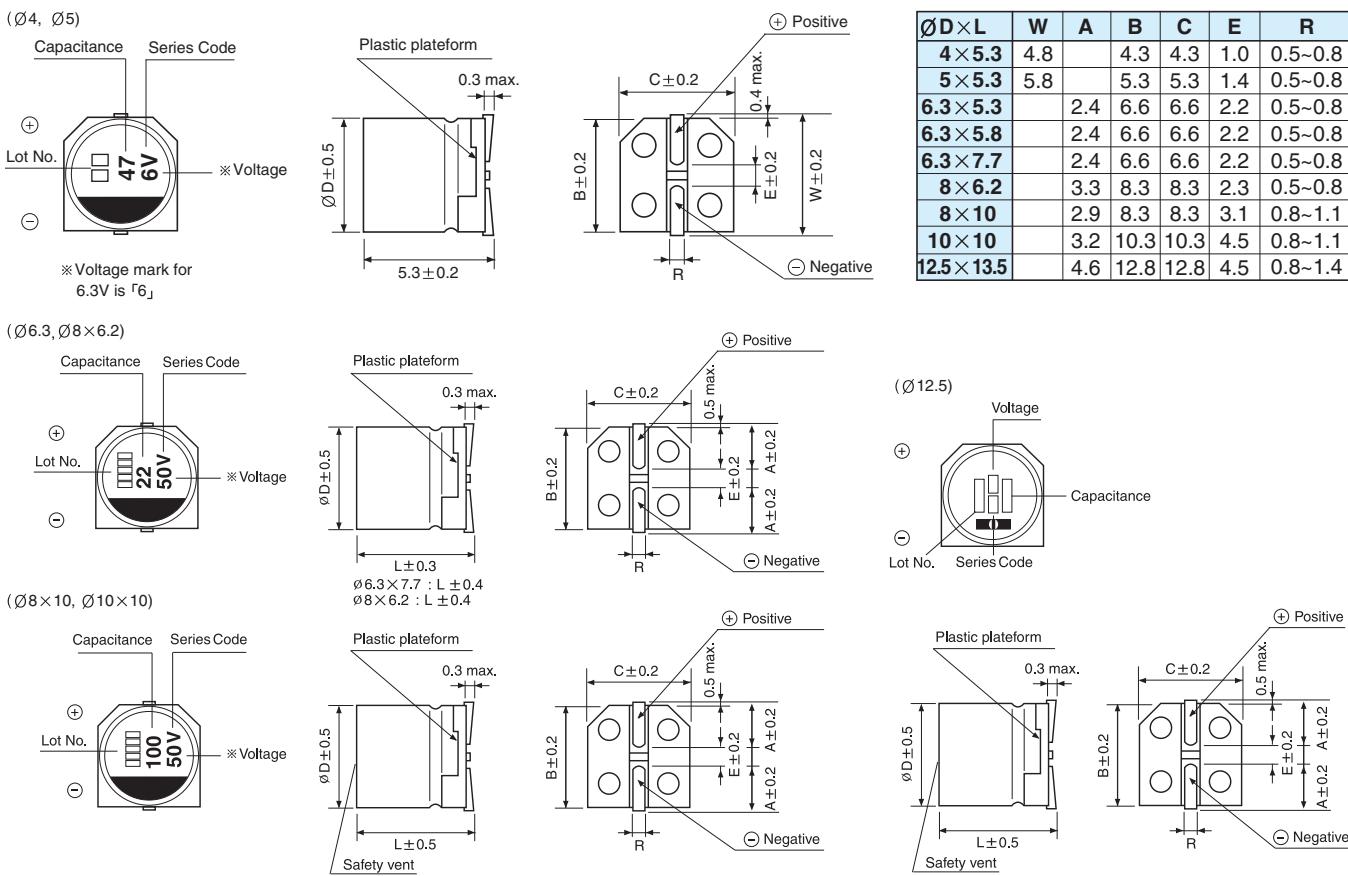
NC ← SC → RC  
Non-polar  
Wide temp



Item	Characteristics																																																											
<b>Operating temperature range</b>	-40 ~ +85°C																																																											
<b>Leakage current max.</b>	WV ≤ 100 I = 0.01CV or 3μA whichever is greater (after 2 minutes) WV ≥ 160 I = 0.04CV + 100μA(after 1 minutes)																																																											
<b>Capacitance tolerance</b>	±20% at 120Hz, 20°C																																																											
<b>Dissipation factor max. (at 120Hz, 20°C)</b>	WV	4	6.3	10	16	25	35	50	63	100	160	200	250	400	450																																													
	tanδ	0.40	0.35	0.24	0.20	0.16	0.15	0.12	0.12	0.12	0.20	0.20	0.25	0.25	0.25																																													
<b>Low temperature characteristics (Impedance ratio at 120Hz)</b>	<table border="1"> <tr> <td>WV</td><td>4</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35 ~ 100</td><td>160 ~ 250</td><td>400 ~ 450</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Z-25°C/Z+20°C</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>2</td><td>3</td><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Z-40°C/Z+20°C</td><td>12</td><td>10</td><td>8</td><td>6</td><td>4</td><td>3</td><td>6</td><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>															WV	4	6.3	10	16	25	35 ~ 100	160 ~ 250	400 ~ 450							Z-25°C/Z+20°C	6	5	4	3	2	2	3	6							Z-40°C/Z+20°C	12	10	8	6	4	3	6	10						
WV	4	6.3	10	16	25	35 ~ 100	160 ~ 250	400 ~ 450																																																				
Z-25°C/Z+20°C	6	5	4	3	2	2	3	6																																																				
Z-40°C/Z+20°C	12	10	8	6	4	3	6	10																																																				
<b>Load life (after application of the rated voltage for 2000 hours at 85°C)</b>	<table border="1"> <tr> <td>Leakage current</td><td colspan="14">Less than specified value</td></tr> <tr> <td>Capacitance change</td><td colspan="14">Within ±20% of initial value (Small size : ±25%)</td></tr> <tr> <td>tanδ</td><td colspan="14">Less than 200% of the specified value</td></tr> </table>															Leakage current	Less than specified value														Capacitance change	Within ±20% of initial value (Small size : ±25%)														tanδ	Less than 200% of the specified value													
Leakage current	Less than specified value																																																											
Capacitance change	Within ±20% of initial value (Small size : ±25%)																																																											
tanδ	Less than 200% of the specified value																																																											
<b>Shelf life(at 85°C)</b>	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4																																																											
<b>Resistance to soldering heat</b>	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.																																																											
	<table border="1"> <tr> <td>Leakage current</td><td colspan="14">Less than specified value</td></tr> <tr> <td>Capacitance change</td><td colspan="14">Within ±10% of initial value</td></tr> <tr> <td>tanδ</td><td colspan="14">Less than specified value</td></tr> </table>															Leakage current	Less than specified value														Capacitance change	Within ±10% of initial value														tanδ	Less than specified value													
Leakage current	Less than specified value																																																											
Capacitance change	Within ±10% of initial value																																																											
tanδ	Less than specified value																																																											

## ● DRAWING -Series code of SC is "V"

Unit : mm



## SC series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$	WV	4	6.3		10		16		25		35		50	
1.0													4×5.3	10
2.2											4×5.3	11	4×5.3	15
3.3									4×5.3	15	4×5.3	16	4×5.3	18
4.7							4×5.3	16	4×5.3	18	4×5.3	19	4×5.3	24
											5×5.3		5×5.3	25
10	4×5.3	16	4×5.3	19	4×5.3	21	4×5.3	21	4×5.3	24	4×5.3	27	5×5.3	41
									5×5.3	30	5×5.3	32	6.3×5.3	43
22	4×5.3	24	4×5.3	29	4×5.3	28	4×5.3	30	5×5.3	41	6.3×5.3	55	6.3×5.3	71
					5×5.3	36	5×5.3	41	6.3×5.3	53			6.3×5.8	73
33	4×5.3	29	4×5.3	30	4×5.3	34	5×5.3	43	5×5.3	50	6.3×5.3	65	6.3×7.7	94
			5×5.3	41	5×5.3	44	6.3×5.3	58	6.3×5.3	64	6.3×5.8	67	8×6.2	95
47	4×5.3	35	4×5.3	36	5×5.3	47	5×5.3	52	6.3×5.3	70	6.3×7.7	94	6.3×7.7	105
			5×5.3	48	6.3×5.3	62	6.3×5.3	69	6.3×5.8	72	8×6.2	105	8×10	140
100	5×5.3	54	5×5.3	60	6.3×5.3	80	6.3×5.3	88	8×6.2	145	6.3×7.7	132	8×10	181
	6.3×5.3	68	6.3×5.3	82	6.3×5.8	82	6.3×5.8	91			8×10	175	10×10	195
220	6.3×5.3	93	6.3×5.8	91	6.3×7.7	173	6.3×7.7	162	8×10	232	10×10	265	10×10	320
					8×6.2	175	8×10	215	10×10	250				
330			6.3×7.7	188	8×10	240	8×10	270	10×10	305	10×10	360	12.5×13.5	600
			8×6.2	190										
470			8×10	265	8×10	290	8×10	307	10×10	400	12.5×13.5	600		
							10×10	330						
1000			8×10	370	10×10	454	12.5×13.5	710	12.5×13.5	820				
			10×10	400										
1500			10×10	480	12.5×13.5	850	12.5×13.5	870						
2200			12.5×13.5	890	12.5×13.5	960								

Ripple current (mA rms) at 85°C, 120Hz  
 Case size ØD × L (mm)

$\mu\text{F}$	WV	63	100		160		200		250		400		450	
2.2													10×10	85
3.3			6.3×5.8	29							10×10	90	10×10	100
4.7	6.3×5.8	31	6.3×5.8	35			10×10	100	10×10	100	12.5×13.5	115	12.5×13.5	115
			8×6.2	40										
10	6.3×5.8	46	8×10	77	10×10	100	12.5×13.5	150	12.5×13.5	150				
22	8×6.2	96	8×10	100	12.5×13.5	240	12.5×13.5	260						
33	8×10	117	10×10	130	12.5×13.5	260								
47	10×10	140	10×10	155										
68	10×10	160	12.5×13.5	350										
100	12.5×13.5	370	12.5×13.5	420										
220	12.5×13.5	550												

Ripple current (mA rms) at 85°C, 120Hz  
 Case size ØD × L (mm)

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz
Coefficient	0.70	1.00	1.17	1.36	1.50

# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

## RC Chip type, Wide Temperature Range Series



SC → RC  
Wide temp.

- Wide operating temperature range of -55 ~ +105°C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

Item	Characteristics												
<b>Operating temperature range</b>	-55 ~ +105°C												
<b>Leakage current max.</b>	$I = 0.01CV$ or $3\mu A$ whichever is greater (after 2 minutes)												
<b>Capacitance tolerance</b>	$\pm 20\%$ at 120Hz, 20°C												
<b>Dissipation factor max. (at 120Hz, 20°C)</b>	WV	6.3	10	16	25	35	50						
	$\tan\delta$	0.27	0.23	0.19	0.15	0.13	0.11						
<b>Low temperature characteristics (Impedance ratio at 120Hz)</b>	WV	6.3	10	16	25	35	50						
	Z-25°C/Z+20°C	3	3	2	2	2	2						
	Z-55°C/Z+20°C	8	5	4	3	3	3						
<b>Load life (after application of the rated voltage for 1000 hours at 105°C)</b>	Leakage current	Less than specified value											
	Capacitance change	Within $\pm 25\%$ of initial value											
	$\tan\delta$	Less than 200% of specified value											
<b>Shelf life (at 105°C)</b>	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4												
<b>Resistance to soldering heat</b>	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.												
	Leakage current	Less than specified value											
	Capacitance change	Within $\pm 10\%$ of initial value											
	$\tan\delta$	Less than specified value											

### DRAWING (See page 62)

Unit : mm

-Series code of RC is "F"

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	6.3	10	16	25	35	50
1.0							$4 \times 5.3$ 7
2.2							$4 \times 5.3$ 11
3.3							$4 \times 5.3$ 13
4.7					$4 \times 5.3$ 13	$4 \times 5.3$ 14	$5 \times 5.3$ 18
10				$4 \times 5.3$ 17	$5 \times 5.3$ 23	$5 \times 5.3$ 24	$6.3 \times 5.3$ 31
22	$4 \times 5.3$ 22	$5 \times 5.3$ 27	$5 \times 5.3$ 30	$6.3 \times 5.3$ 39	$6.3 \times 5.3$ 42	$6.3 \times 5.8$ 45	
33	$5 \times 5.3$ 31	$5 \times 5.3$ 33	$6.3 \times 5.3$ 43	$6.3 \times 5.3$ 48	$6.3 \times 5.8$ 52	$6.3 \times 7.7$ 60	
47	$5 \times 5.3$ 36	$6.3 \times 5.3$ 46	$6.3 \times 5.3$ 51	$6.3 \times 5.8$ 59	$6.3 \times 5.8$ 63	$6.3 \times 7.7$ 63	
100	$6.3 \times 5.3$ 50	$6.3 \times 5.8$ 64	$6.3 \times 5.8$ 64	$6.3 \times 7.7$ 91	$8 \times 10$ 296	$10 \times 10$ 295	
220	$6.3 \times 7.7$ 86	$6.3 \times 7.7$ 105	$6.3 \times 7.7$ 105	$8 \times 10$ 340	$10 \times 10$ 435		
330	$6.3 \times 7.7$ 105	$8 \times 10$ 305	$8 \times 10$ 340	$10 \times 10$ 360			
470	$8 \times 10$ 330	$10 \times 10$ 340	$10 \times 10$ 470				
1000	$10 \times 10$ 475						

Ripple current (mA rms) at 105°C, 120Hz  
Case size ØD × L (mm)

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz
Coefficient	0.70	1.00	1.17	1.36	1.50

# JC Chip type, Higher Capacitance Range Series

- Chip type higher capacitance in large case sizes
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

**S**  
Solvent Proof  
WV ≤ 100V

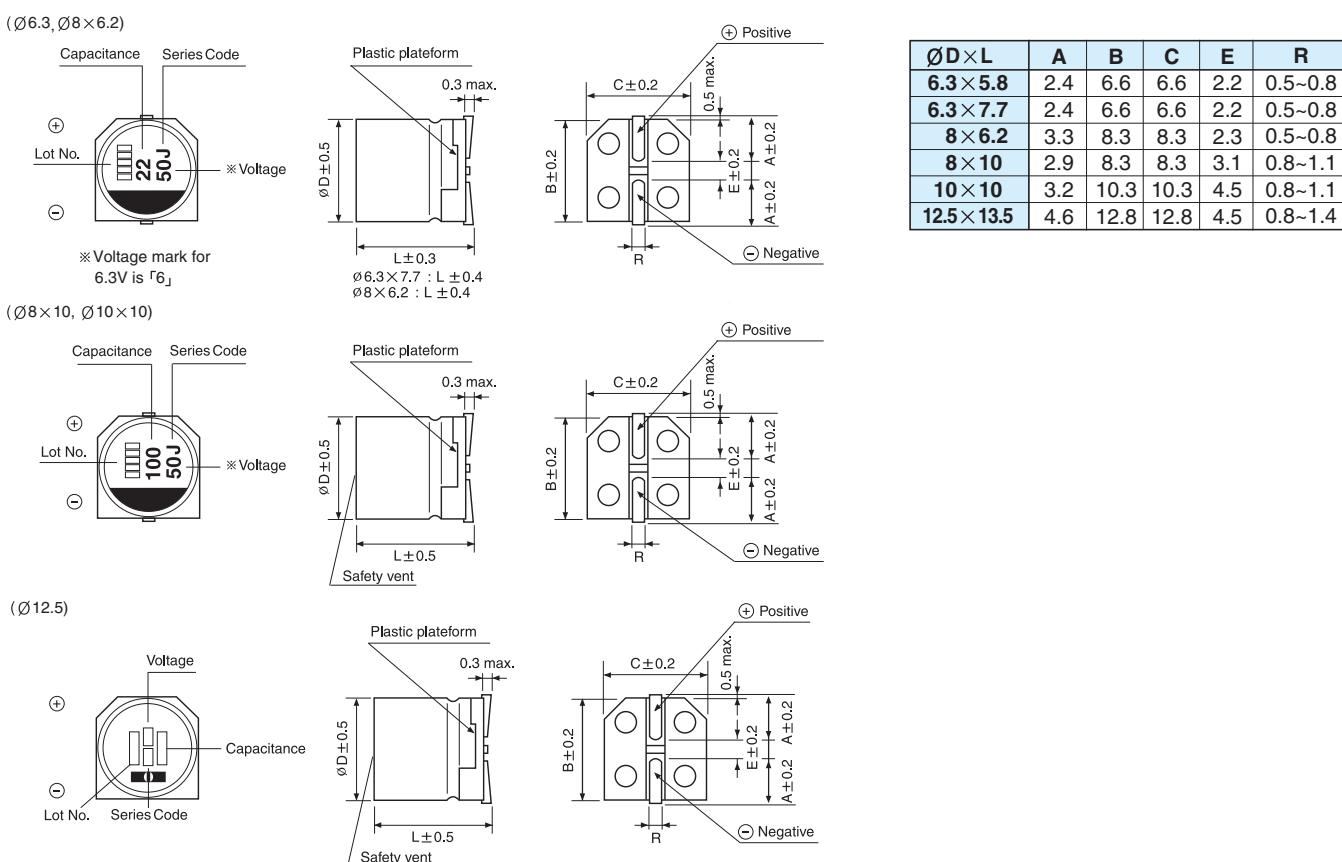
RC → JC  
Long life



Item	Characteristics																					
Operating temperature range	WV ≤ 100 : -55 ~ +105°C WV ≥ 160 : -40 ~ +105°C																					
Leakage current max.	WV ≤ 100 I = 0.01CV or 3μA whichever is greater (after 2 minutes) WV ≥ 160 I = 0.04CV + 100μA(after 1 minutes)																					
Capacitance tolerance	±20% at 120Hz, 20°C																					
Dissipation factor max. (at 120Hz, 20°C)	WV	4	6.3	10	16	25	35	50	63	100	160	200	250	400	450							
	tanδ	0.37	0.28	0.24	0.20	0.16	0.13	0.12	0.10	0.10	0.15	0.15	0.15	0.20	0.20							
Low temperature characteristics (Impedance ratio at 120Hz)	WV		4	6.3	10	16	25 ~ 50		63 ~ 100		160 ~ 250		400 ~ 450									
	Z-25°C/Z+20°C		6	3	3	2	2		3		3		6									
	Z-40°C/Z+20°C		12	8	5	4	3		4		6		10									
	Z-55°C/Z+20°C		12	8	5	4	3		4		-		-									
Load life (after application of the rated voltage for 2000 hours at 105°C)	Leakage current			Less than specified value																		
	Capacitance change			Within ±20% of initial value																		
	tanδ			Less than 200% of specified value																		
Shelf life(at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4																					
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.																					
	Leakage current			Less than specified value																		
	Capacitance change			Within ±10% of initial value																		
	tanδ			Less than specified value																		

## DRAWING -Series code of JC is "J"

Unit : mm



# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

## JC series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$	WV	4	6.3		10		16		25		35		50	
10													6.3×5.8	30
22									6.3×5.8	38	6.3×5.8	42	8×6.2	67
33							6.3×5.8	40	6.3×5.8	48	8×6.2	76	8×10	133
47					6.3×5.8	46	6.3×5.8	50	8×6.2	79	8×10	124	10×10	180
100	6.3×5.8	60	6.3×5.8	60	6.3×5.8	60	8×10	148	8×10	181	10×10	304	10×10	310
220			8×10	161	8×10	173	10×10	330	10×10	351	10×10	450	12.5×13.5	480
330			8×10	288	10×10	318	10×10	441	10×10	372	12.5×13.5	500		
470			10×10	340	10×10	351	10×10	489	10×10	450	12.5×13.5	600		
680			10×10	408	10×10	392	12.5×13.5	500	12.5×13.5	500				
1000			10×10	495	10×10	550	12.5×13.5	600						
1500			10×10	560	12.5×13.5	650								
2200			12.5×13.5	730										

$\mu\text{F}$	WV	63	100		160		200		250		400		450	
3.3									10×10	30	12.5×13.5	30	12.5×13.5	40
4.7							10×10	45	12.5×13.5	65				
10	8×6.2	32			10×10	45	12.5×13.5	75						
22	8×10	60	8×10	90	12.5×13.5	85	12.5×13.5	85						
33	8×10	110	10×10	120	12.5×13.5	95	← Ripple current (mA rms) at 105°C, 120Hz							
47	10×10	130	12.5×13.5	250	↑ Case size ØD × L (mm)									
68	10×10	160	12.5×13.5	300										
100	12.5×13.5	270												

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz $\leq$
Coefficient	0.70	1.00	1.17	1.36	1.50

# JH Chip type, High Ripple Current Series

- High Ripple current Compared with JC series
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

**S**  
Solvent Proof  
WV  $\leq$  100V

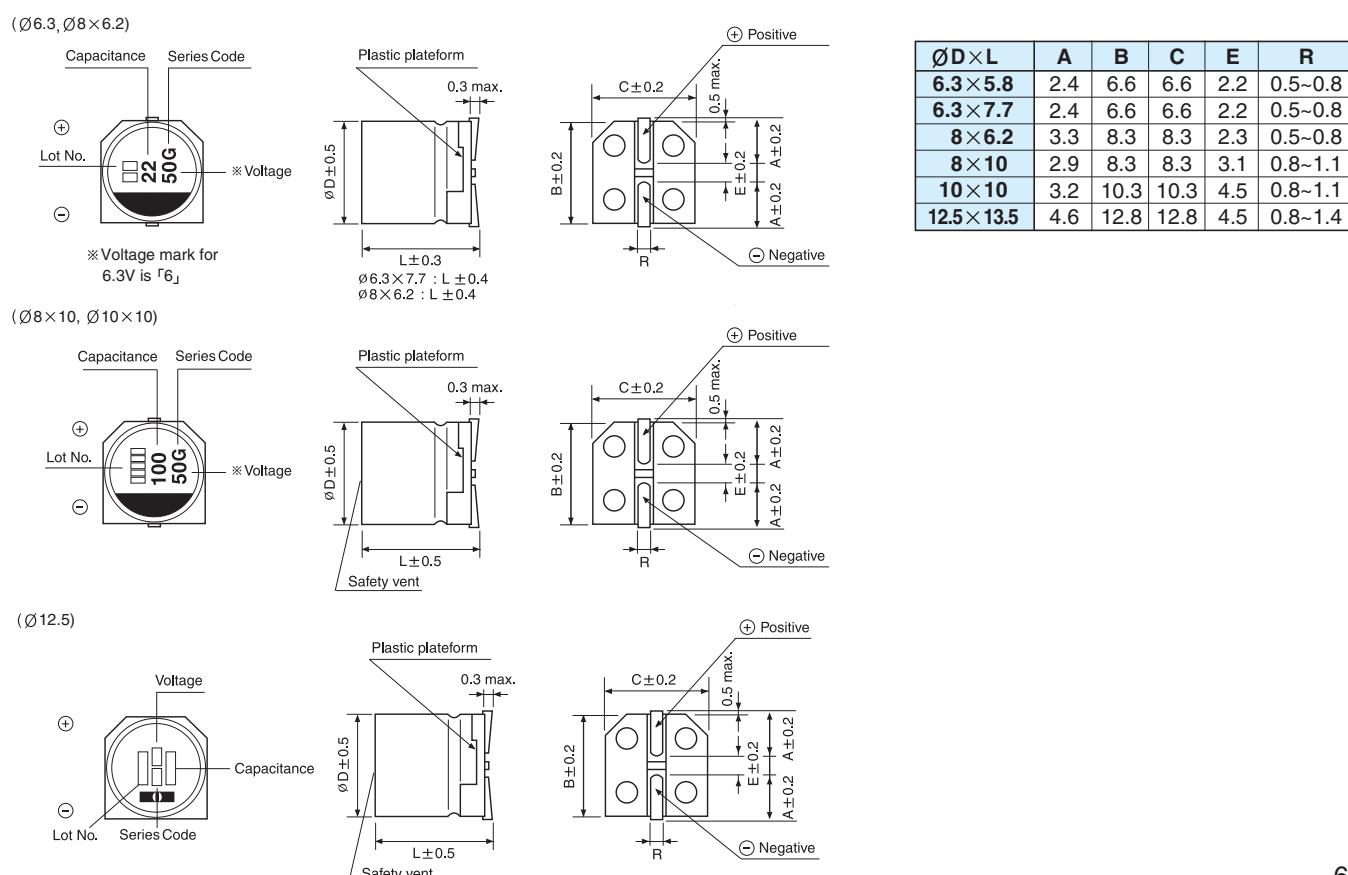
JC → **JH**  
High Ripple



Item	Characteristics																							
Operating temperature range	WV $\leq$ 100 : -55 ~ +105°C WV $\geq$ 160 : -40 ~ +105°C																							
Leakage current max.	WV $\leq$ 100 I = 0.01CV or 3 $\mu$ A whichever is greater (after 2 minutes) WV $\geq$ 160 I = 0.04CV + 100 $\mu$ A(after 1 minutes)																							
Capacitance tolerance	$\pm 20\%$ at 120Hz, 20°C																							
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50	63	100	160	200	250	400	450										
	tan $\delta$	0.28	0.24	0.20	0.16	0.13	0.12	0.10	0.10	0.15	0.15	0.15	0.20	0.20										
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25 ~ 50	63 ~ 100	100	160 ~ 250	200	250	400	450												
	Z-25°C/Z+20°C	3	3	2	2	3	3	3	6	6	6	6												
	Z-40°C/Z+20°C	-	-	-	-	-	-	6	10	10	10	10												
Load life (after application of the rated voltage for 2000 hours at 105°C)	Z-55°C/Z+20°C	8	5	4	3	4	4	-	-	-	-	-												
	Leakage current	Less than specified value																						
	Capacitance change	Within $\pm 20\%$ of initial value																						
Shelf life(at 105°C)	tan $\delta$	Less than 200% of specified value																						
	After 1000 hours no load test, leakage current, capacitance and tan $\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4																							
	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.																							
Resistance to soldering heat	Leakage current	Less than specified value																						
	Capacitance change	Within $\pm 10\%$ of initial value																						
	tan $\delta$	Less than specified value																						

## DRAWING -Series code of JH is "G"

Unit : mm



# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

## JH series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$	WV	6.3	10	16	25	35		
10								
22					6.3×5.8	57	6.3×5.8	63
33				6.3×5.8	60	6.3×5.8	72	8×6.2
47		6.3×5.8	69	6.3×5.8	75	8×6.2	120	8×10
100	6.3×5.8	90	6.3×5.8	90	8×10	222	8×10	270
220	8×10	242	8×10	260	10×10	495	10×10	525
330	8×10	432	10×10	477	10×10	660	10×10	558
470	10×10	510	10×10	527	10×10	735	10×10	675
680	10×10	612	10×10	588	12.5×13.5	750	12.5×13.5	750
1000	10×10	743	10×10	825	12.5×13.5	900		
1500	10×10	840	12.5×13.5	975				
2200	12.5×13.5	1095						

↑ Ripple current (mA rms) at 105°C, 120Hz  
Case size ØD × L (mm)

$\mu\text{F}$	WV	50		63		100		
10		6.3×5.8	45	8×6.2	48			
22		8×6.2	100	8×10	90	8×10	135	
33		8×10	200	8×10	165	10×10	180	
47		10×10	270	10×10	195	12.5×13.5	375	
68		10×10	315	10×10	240	12.5×13.5	450	
100		10×10	465	12.5×13.5	405			
220		12.5×13.5	720					

$\mu\text{F}$	WV	160	200	250	400	450		
3.3				10×10	45	12.5×13.5	45	12.5×13.5
4.7			10×10	65	12.5×13.5	95		
10		10×10	65	12.5×13.5	110			
22		12.5×13.5	125	12.5×13.5	125			
33		12.5×13.5	140					
47								
68								
100								

↑ Ripple current (mA rms) at 105°C, 120Hz  
Case size ØD × L (mm)

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz
Coefficient	0.70	1.00	1.17	1.36	1.50

# JM

 Chip type, Long Life Series

- Long Life Compared with JC series
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

**S**  
Solvent Proof  
 $WV \leq 100V$

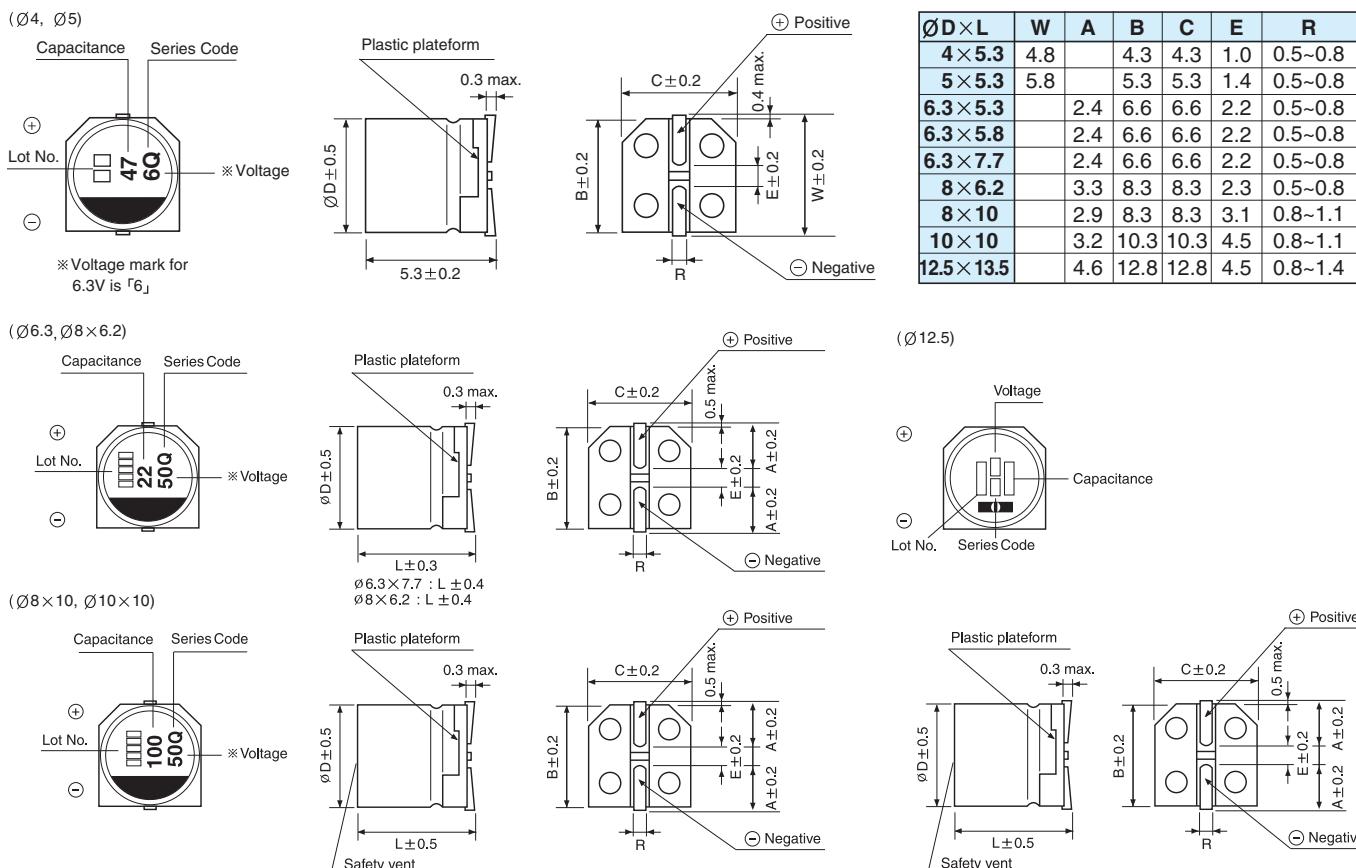
JC → JM  
Long life



Item	Characteristics																			
Operating temperature range	$-25 \sim +105^{\circ}\text{C}$																			
Leakage current max.	$WV \leq 100 \quad I = 0.01\text{CV} \text{ or } 3\mu\text{A}$ whichever is greater (after 2 minutes) $WV \geq 160 \quad I = 0.04\text{CV} + 100\mu\text{A}$ (after 1 minutes)																			
Capacitance tolerance	$\pm 20\%$ at 120Hz, $20^{\circ}\text{C}$																			
Dissipation factor max. (at 120Hz, $20^{\circ}\text{C}$ )	WV	6.3	10	16	25	35	50	63	100	160	200	250	400	450						
	$\tan\delta$	0.32	0.28	0.21	0.21	0.18	0.18	0.12	0.12	0.15	0.15	0.15	0.20	0.20						
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25 ~ 50	63 ~ 100	100	160 ~ 250	200	250	400	450	Z-25°C/Z+20°C	8	8	6	4	3	3	6
Load life (after application of the rated voltage for 3000 hours at $105^{\circ}\text{C}$ )	Leakage current	Less than specified value																		
	Capacitance change	Within $\pm 30\%$ of initial value																		
	$\tan\delta$	Less than 300% of specified value																		
Shelf life (at $105^{\circ}\text{C}$ )	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at $20^{\circ}\text{C}$ by the KS C IEC 60384 - 4																			
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to $20^{\circ}\text{C}$ after exposing them at $250^{\circ}\text{C}$ for 10 seconds.																			
	Leakage current	Less than specified value																		
	Capacitance change	Within $\pm 10\%$ of initial value																		
	$\tan\delta$	Less than specified value																		

● DRAWING -Series code of JM is "Q"

Unit : mm



# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

## JM series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$	WV	6.3	10	16	25	35					
10		4×5.3	10	4×5.3	15	4×5.3	19	5×5.3	24	6.3×5.3	26
22		4×5.3	25	5×5.3	30	5×5.3	33	6.3×5.3	38	6.3×5.8	42
33		5×5.3	35	5×5.3	38	6.3×5.3	42	6.3×5.8	48	8×6.2	76
47		5×5.3	42	6.3×5.3	52	6.3×5.8	60	8×6.2	79	8×10	124
100		6.3×5.8	60	6.3×5.8	60	8×10	148	8×10	181	10×10	310
220		8×10	161	8×10	173	10×10	330	10×10	351	10×10	480
330		8×10	288	10×10	318	10×10	441	10×10	372	12.5×13.5	500
470		10×10	340	10×10	351	10×10	489	10×10	450	12.5×13.5	600
680		10×10	408	10×10	392	12.5×13.5	500	12.5×13.5	500		
1000		10×10	495	10×10	550	12.5×13.5	600				
1500		10×10	560	12.5×13.5	650						
2200		12.5×13.5	730								

Ripple current (mA rms) at 105°C, 120Hz  
Case size ØD × L (mm)

$\mu\text{F}$	WV	50	63	100	
10		6.3×5.8	30	8×6.2	32
22		8×6.2	67	8×10	60
33		8×10	133	8×10	110
47		10×10	180	10×10	130
68		10×10	200	10×10	160
100		10×10	310	12.5×13.5	270
220		12.5×13.5	480		

$\mu\text{F}$	WV	160	200	250	400	450			
3.3				10×10	30	12.5×13.5	30	12.5×13.5	40
4.7			10×10	45	12.5×13.5	65			
10		10×10	45	12.5×13.5	75				
22		12.5×13.5	85	12.5×13.5	85				
33		12.5×13.5	95						
47									
68									
100									

Ripple current (mA rms) at 105°C, 120Hz  
Case size ØD × L (mm)

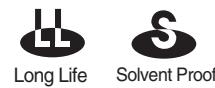
### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz $\leq$
Coefficient	0.70	1.00	1.17	1.36	1.50

# CA

Chip type, Long Life  
Series

- Chip type, long life capacitance in large case sizes
- Chip type with load life of 5000 hours at 105°C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive



JC → CA  
Long life



Item	Characteristics												
Operating temperature range	$\text{ØD} \leq 6.3$ -40 ~ +105°C				$\text{ØD} \geq 8$ -55 ~ +105°C								
Leakage current max.	$I = 0.01\text{CV}$ or $3\mu\text{A}$ whichever is greater (after 2 minutes)												
Capacitance tolerance	$\pm 20\%$ at 120Hz, 20°C												
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50						
	$\tan\delta$	0.28	0.24	0.2	0.16	0.13	0.12						
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50						
	Z-25°C/Z+20°C	2	2	2	3	3	3						
	Z-55°C/Z+20°C	14	12	8	6	4	4						
	Z-40°C/Z+20°C	14	12	8	6	4	4						
Load life (after application of the rated voltage for 5000 hours at 105°C)	Leakage current	Less than specified value											
	Capacitance change	Within $\pm 30\%$ of initial value											
	$\tan\delta$	Less than 300% of specified value											
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4												
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.												
	Leakage current	Less than specified value											
	Capacitance change	Within $\pm 10\%$ of initial value											
	$\tan\delta$	Less than specified value											

● DRAWING (See page 62)

Unit : mm

-Series code of CA is "A"

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$	WV	6.3	10	16	25	35	50
10							6.3×5.8 30
22					6.3×5.8 38	6.3×5.8 42	6.3×7.7 120
33			6.3×5.8 40	6.3×5.8 48	6.3×7.7 57	8×10 140	
47		6.3×5.8 46	6.3×5.8 50	6.3×7.7 63	8×10 92	8×10 170	
100	6.3×5.8 60	6.3×7.7 81	6.3×7.7 81	8×10 116	10×10 151	10×10 310	
220	6.3×7.7 101	8×10 141	10×10 216	10×10 216	10×10 216		
330	8×10 160	10×10 238	10×10 238	10×10 238			
470	10×10 254	10×10 254	10×10 254				
1000	10×10 313						

← Ripple current (mA rms) at 105°C, 120Hz  
Case size ØD×L (mm)

● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz
Coefficient	0.70	1.00	1.17	1.36	1.50

# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

**CB** Chip type,Long Life Series



RC → **CB**  
Long life

- Chip type with load life 5000 hours at 105°C
- Chip type with 5.5mmL Height
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

Item	Characteristics														
<b>Operating temperature range</b>	-40 ~ +105°C														
<b>Leakage current max.</b>	$I = 0.01CV$ or $3\mu A$ whichever is greater (after 2 minutes)														
<b>Capacitance tolerance</b>	$\pm 20\%$ at 120Hz, 20°C														
<b>Dissipation factor max. (at 120Hz, 20°C)</b>	WV	4	6.3	10	16	25	35	50							
	$\tan\delta$	0.32	0.28	0.24	0.2	0.16	0.13	0.12							
<b>Low temperature characteristics (Impedance ratio at 120Hz)</b>	WV	4	6.3	10	16	25	35 ~ 50								
	Z-25°C/Z+20°C	12	10	8	6	4	4								
	Z-40°C/Z+20°C	16	14	12	8	6	4								
<b>Load life (after application of the rated voltage for 5000 hours at 105°C)</b>	Capacitance change	Within $\pm 30\%$ of initial value													
	$\tan\delta$	Less than 300% of the specified value													
	Leakage current	Less than specified value													
<b>Shelf life(at 105°C)</b>	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4														
<b>Resistance to soldering heat</b>	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.														
	Leakage current	Less than specified value													
	Capacitance change	Within $\pm 10\%$ of initial value													
	$\tan\delta$	Less than specified value													

## ● DRAWING (See page 62)

Unit : mm

-Series code of CB is "B"

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

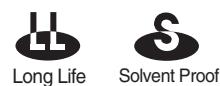
$\mu F$	WV	4	6.3	10	16	25	35	50
1.0								4×5.3 7
2.2								4×5.3 11
3.3								4×5.3 14
4.7						4×5.3 14	4×5.3 15	5×5.3 19
6.8						4×5.3 17	5×5.3 21	6.3×5.3 26
10					4×5.3 19	5×5.3 24	5×5.3 26	6.3×5.3 33
15				4×5.3 22	5×5.3 28	5×5.3 31	6.3×5.3 37	6.3×5.3 40
22	4×5.3 24	4×5.3 25	5×5.3 30	5×5.3 33	6.3×5.3 42	6.3×5.3 45		
33	5×5.3 33	5×5.3 35	5×5.3 38	6.3×5.3 48				
47	5×5.3 40	5×5.3 42	6.3×5.3 52	6.3×5.3 57				
68	5×5.3 48	6.3×5.3 55	6.3×5.3 63					
100	5×5.3 55	6.3×5.3 67	6.3×5.3 72					

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz
Coefficient	0.70	1.00	1.17	1.36	1.50

**JL** Chip type, Long Life Series

- Chip type, long life capacitance in large case size
- For ECU
- Application to automatic insertion machine using carrier tape
- Complied to the RoHS directive



CA → **JL**  
Long life



Item	Characteristics										
Operating temperature range	-40 ~ +105°C										
Leakage current	I = 0.03CV or $4\mu A$ whichever is greater (after 2 minutes)										
Capacitance tolerance	$\pm 20\%$ (20°C, 120Hz)										
Dissipation factor max. (at 120Hz, 20°C)	Rated Voltage(V)	10	16	25	35	50					
	$\tan\delta$	0.32	0.24	0.21	0.18	0.18					
Low temperature characteristics (Impedance ratio at 120Hz)	WV	10	16	25	35	50					
	Z-25°C/Z+20°C	6	4	3	2	2					
	Z-40°C/Z+20°C	12	10	8	6	6					
Load life (after application of the rated voltage for 10000 hours at 105°C)	Leakage current	Less than specified value									
	Capacitance change	Within $\pm 30\%$ of the initial value									
	$\tan\delta$	Less than 300% of the specified value									
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4										
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.										
	Leakage current	Less than specified value									
	Capacitance change	Within $\pm 30\%$ of the initial value									
	$\tan\delta$	Less than 300% of the specified value									

## ● DRAWING (See page 62)

Unit : mm

-Series code of JL is "P"

## ● DIMENSIONS &amp; MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	10	16	25	35	50	
33							8×10      75
47							8×10      90
100		8×10	270	8×10	163	10×10	132
220	8×10	270	8×10	270	10×10	200	10×10
330	8×10	270	10×10	315	10×10	304	167
470	10×10	315	10×10	315			

↑                    ↑  
Ripple current (mA rms) at 105°C, 120Hz  
Case size ØD×L(mm)

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz
Coefficient	0.70	1.00	1.17	1.36	1.50

# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

**ZC** Height 5.5mmL, Low Impedance Series



RC → **ZC**  
Low Imp.

Item	Characteristics										
<b>Operating temperature range</b>	-55 ~ +105°C										
<b>Leakage current max.</b>	$I = 0.01CV$ or $3\mu A$ whichever is greater (after 2 minutes)										
<b>Capacitance tolerance</b>	$\pm 20\%$ at 120Hz, 20°C										
<b>Dissipation factor max. (at 120Hz, 20°C)</b>	WV	6.3	10	16	25	35					
	$\tan\delta$	0.22	0.19	0.16	0.14	0.12					
<b>Low temperature characteristics (Impedance ratio at 120Hz)</b>	WV	6.3	10	16	25	35					
	Z-25°C/Z+20°C	2	2	2	2	3					
	Z-55°C/Z+20°C	4	4	3	3	3					
<b>Load life (after application of the rated voltage for 1000 hours at 105°C)</b>	Leakage current	Less than specified value									
	Capacitance change	Within $\pm 20\%$ of initial value									
	$\tan\delta$	Less than 200% of specified value									
<b>Shelf life (at 105°C)</b>	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4										
<b>Resistance to soldering heat</b>	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.										
	Leakage current	Less than specified value									
	Capacitance change	Within $\pm 10\%$ of initial value									
	$\tan\delta$	Less than specified value									

## ● DRAWING (See page 62)

Unit : mm

-Series code of ZC is "Z"

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	6.3			10			16			25			35		
1.0														4×5.3	5.0	50
1.5														4×5.3	5.0	50
2.2														4×5.3	5.0	50
3.3														4×5.3	5.0	50
4.7														4×5.3	5.0	50
6.8														4×5.3	5.0	80
10								4×5.3	5.0	50	5×5.3	2.6	80	5×5.3	2.6	80
15								5×5.3	2.6	80	6.3×5.3	1.3	75	6.3×5.3	1.3	115
22	4×5.3	5.0	50	5×5.3	2.6	80	5×5.3	2.6	80	6.3×5.3	1.3	115	6.3×5.3	1.3	115	
33	5×5.3	2.6	80	5×5.3	2.6	80	6.3×5.3	1.3	115	6.3×5.3	1.3	115				
47	5×5.3	2.6	80	6.3×5.3	1.3	115	6.3×5.3	1.3	115							
68	6.3×5.3	1.3	115	6.3×5.3	1.3	115										
100	6.3×5.3	1.3	115													

↑              ↑  
Ripple current (mA rms) at 105°C, 100kHz  
Impedance ( $\Omega$ ) at 20°C, 100kHz  
Case size ØD × L(mm)

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz
Coefficient	0.35	0.5	0.64	0.83	1.00

# CK

 Chip type, Low Impedance, High CV Series


ZC → CK  
Low Imp.

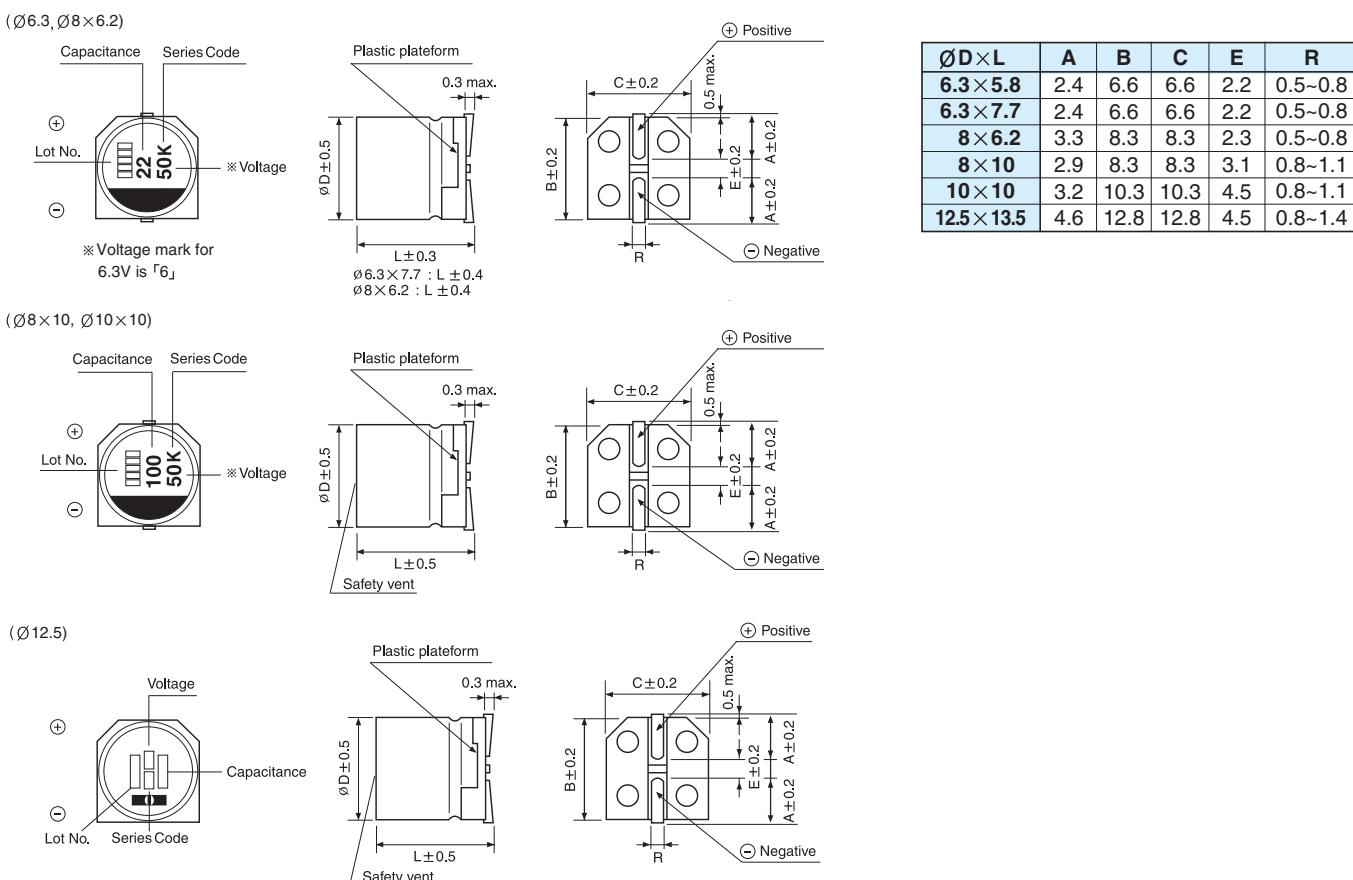


- Chip type, low impedance temperature range up to 105°C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

Item	Characteristics																		
Operating temperature range	-55 ~ +105°C																		
Leakage current max.	$I = 0.01\text{CV}$ or $3\mu\text{A}$ whichever is greater (after 2 minutes)																		
Capacitance tolerance	$\pm 20\%$ at 120Hz, 20°C																		
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50	63	80	100									
	tan $\delta$	0.24	0.19	0.16	0.14	0.12	0.12	0.10	0.10	0.10									
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50	63~100											
	Z-25°C/Z+20°C	2	2	2	2	2	2	2	3										
	Z-55°C/Z+20°C	3	3	3	3	3	3	3	4										
Load life (after application of the rated voltage for 2000 hours at 105°C)	Leakage current	Less than specified value																	
	Capacitance change	Within $\pm 25\%$ of initial value																	
	tan $\delta$	Less than 200% of specified value																	
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tan $\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4																		
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.																		
	Leakage current	Less than specified value																	
	Capacitance change	Within $\pm 10\%$ of initial value																	
	tan $\delta$	Less than specified value																	

● DRAWING -Series code of CK is "K"

Unit : mm



# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

## CK series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$	WV	6.3			10			16			25			35			50			
10																	6.3×5.8	1.0	165	
15																	6.3×5.8	1.0	165	
22																	6.3×5.8	1.0	165	
33								6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×7.7	0.68	280	
																	8×6.2	0.63	300	
47					6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×7.7	0.68	280	
																	8×6.2	0.63	300	
68		6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×7.7	0.34	280				
																	8×6.2	0.38	300	
100		6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×7.7	0.34	280				8×10	0.17	450	
											8×6.2	0.26	300					10×10	0.18	670
150		6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×7.7	0.34	280				8×10	0.17	450				
								8×6.2	0.26	300				8×10	0.17	450				
220		6.3×5.8	0.44	230	6.3×7.7	0.34	280	6.3×7.7	0.34	280				8×10	0.17	450	10×10	0.09	670	
					8×6.2	0.26	300	8×6.2	0.26	300										
330		6.3×7.7	0.34	280				8×10	0.17	450	8×10	0.17	450	10×10	0.15	670				
		8×6.2	0.26	300																
470		8×10	0.17	450	8×10	0.17	450	10×10	0.09	670										
680		8×10	0.17	450	10×10	0.09	670													
1000		10×10	0.09	670																
1500		10×10	0.09	670																

$\mu\text{F}$	WV	63			80			100		
10		6.3×5.8	2.8	80	6.3×7.7	2.4	60			
22		6.3×7.7	2.1	120	8×10	1.3	130	8×10	2.0	130
33		8×10	1.0	250	8×10	1.3	130	10×10	1.5	200
47		8×10	1.0	250	10×10	1.2	200	12.5×13.5	1.0	500
68		10×10	0.8	400	12.5×13.5	0.8	500	12.5×13.5	1.0	500
100		10×10	0.8	400	12.5×13.5	0.8	500			
150		12.5×13.5	0.6	800	12.5×13.5	0.8	500			
220		12.5×13.5	0.6	800						

↑ Ripple current (mA rms) at 105°C, 100kHz  
 ↑ Impedance ( $\Omega$ ) at 20°C, 100kHz  
 ↑ Case size ØD × L (mm)

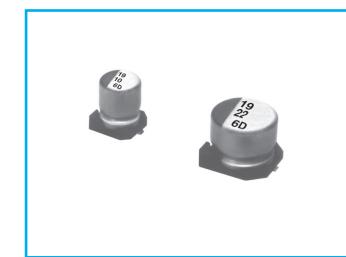
### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz
Coefficient	0.35	0.5	0.64	0.83	1.00

# CD Chip type, Extremely Low Impedance Series



CK → CD  
Low Imp.



- Chip type, low impedance temperature range up to 105°C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

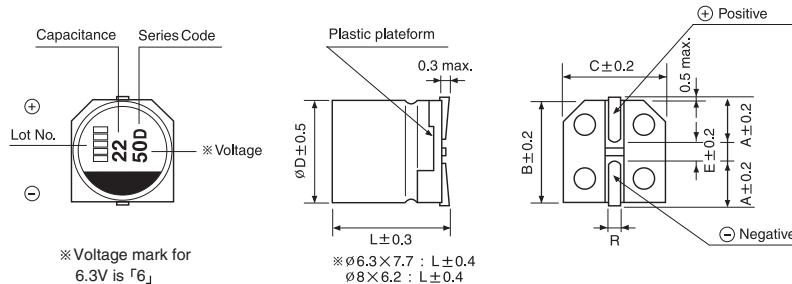
Item	Characteristics												
Operating temperature range	-55 ~ +105°C												
Leakage current max.	$I = 0.01CV$ or $3\mu A$ whichever is greater (after 2 minutes)												
Capacitance tolerance	$\pm 20\%$ at 120Hz, 20°C												
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50						
	$\tan\delta$	0.24	0.19	0.16	0.14	0.12	0.12						
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50						
	Z-25°C/Z+20°C	2	2	2	2	2	2						
	Z-55°C/Z+20°C	3	3	3	3	3	3						
Load life (after application of the rated voltage for 2000 hours at 105°C)	Leakage current	Less than specified value											
	Capacitance change	Within $\pm 25\%$ of initial value											
	$\tan\delta$	Less than 200% of specified value											
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4												
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them to 250°C for 10 seconds.												
	Leakage current	Less than specified value											
	Capacitance change	Within $\pm 10\%$ of initial value											
	$\tan\delta$	Less than specified value											

## DRAWING

Unit : mm

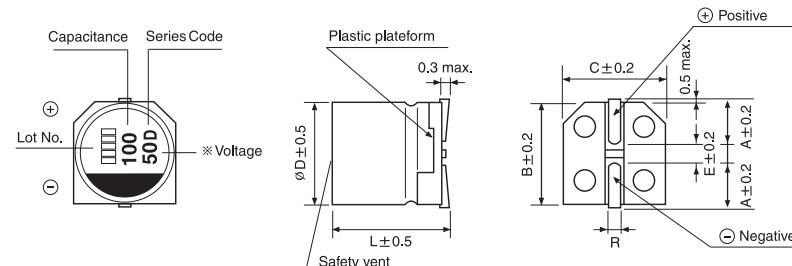
-Series code of CD is "D"

(Ø6.3×5.8, 7.7, Ø8×6.2)



ØD	A	B	C	E	R
6.3×5.8	2.4	6.6	6.6	2.2	0.5~0.8
6.3×7.7	2.4	6.6	6.6	2.2	0.5~0.8
8×6.2	3.3	8.3	8.3	2.3	0.5~0.8
8×10	2.9	8.3	8.3	3.1	0.8~1.1
10×10	3.2	10.3	10.3	4.5	0.8~1.1

(Ø8×10, Ø10×10)



# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

## CD series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$	WV	6.3			10			16			25			35			50		
10																	6.3×5.8	1.00	170
15																	6.3×5.8	0.86	170
22																	6.3×5.8	0.86	170
33								6.3×5.8	0.43	240	6.3×5.8	0.43	240	6.3×5.8	0.50	240	6.3×7.7	0.66	280
																	8×6.2	0.63	300
47					6.3×5.8	0.43	240	6.3×5.8	0.43	240	6.3×5.8	0.43	240	6.3×5.8	0.50	240	6.3×7.7	0.66	280
																	8×6.2	0.63	300
68		6.3×5.8	0.43	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×7.7	0.32	290	8×10	0.32	350
100		6.3×5.8	0.43	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×7.7	0.32	290				8×10	0.16	600
											8×6.2	0.26	300				10×10	0.2	700
150		6.3×5.8	0.43	240	6.3×5.8	0.39	240	6.3×7.7	0.32	290	8×10	0.16	600	8×10	0.16	600			
220		6.3×5.8	0.43	240	6.3×7.7	0.36	290	6.3×7.7	0.32	290				8×10	0.16	600	10×10	0.10	850
								8×6.2	0.26	300	8×6.2	0.26	300						
330		6.3×7.7	0.32	290				8×10	0.16	600	8×10	0.16	600	10×10	0.10	850			
		8×6.2	0.26	300															
470		8×10	0.16	600	8×10	0.16	600	10×10	0.08	850									
680		8×10	0.16	600	10×10	0.08	850												
1000		10×10	0.08	850															
1500		10×10	0.08	850															

↑      ↑      ↓      ↓      ↓      ↓      ↓      ↓      ↓      ↓      ↓      ↓      ↓      ↓      ↓      ↓      ↓      ↓      ↓      ↓

Ripple current (mA rms) at 105°C, 100kHz  
Impedance ( $\Omega$ ) at 20°C, 100kHz  
Case size  $\varnothing D \times L$  (mm)

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz $\leq$
Coefficient	0.35	0.5	0.64	0.83	1.00



## Chip type, High Ripple Current Series

- High Ripple current Compared with CD series
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

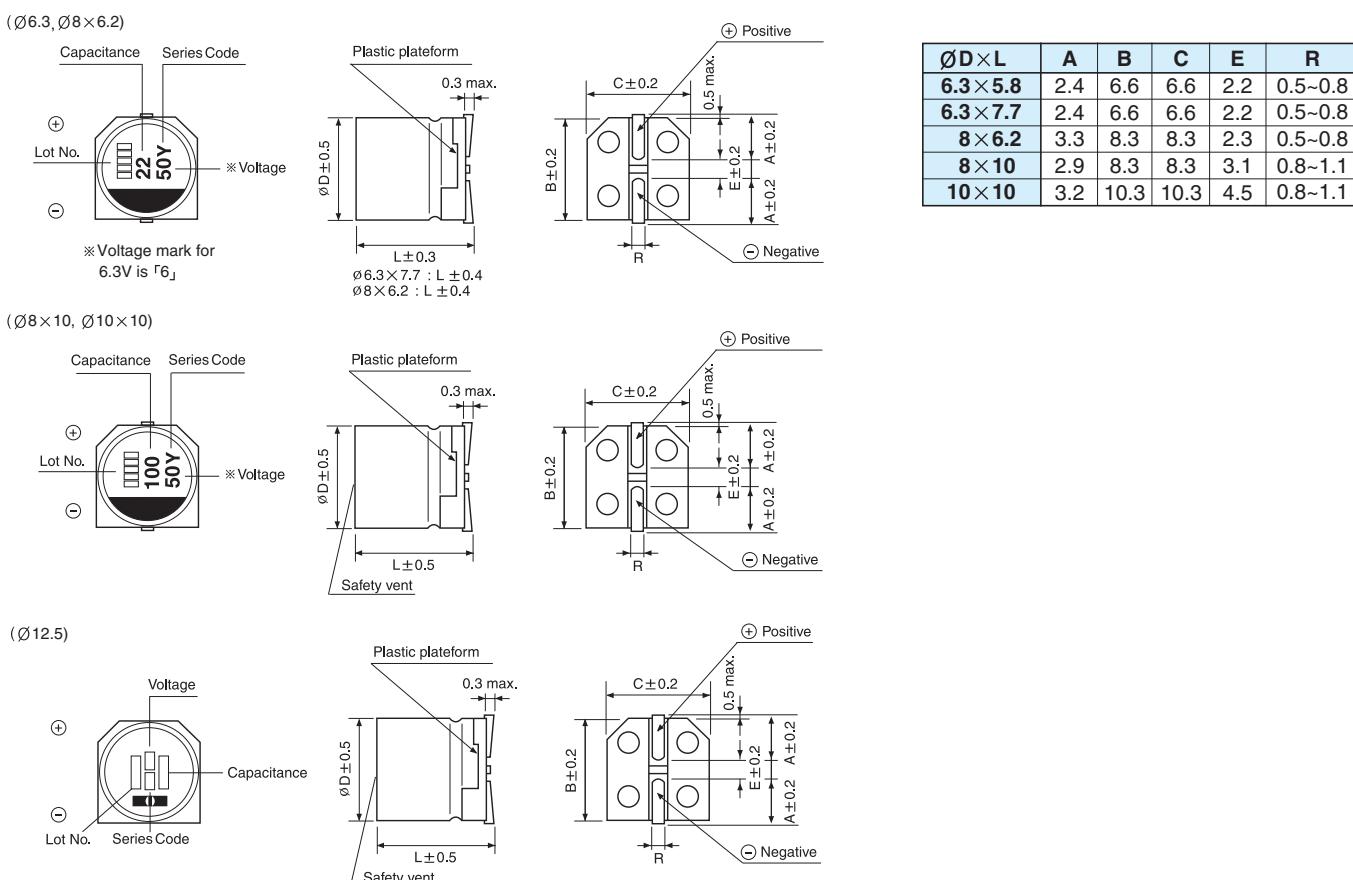
CD → CZ  
High Ripple



Item	Characteristics										
Operating temperature range	-55 ~ +105°C										
Leakage current max.	$I = 0.01\text{CV}$ or $3\mu\text{A}$ whichever is greater (after 2 minutes)										
Capacitance tolerance	$\pm 20\%$ at 120Hz, 20°C										
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35					
	$\tan\delta$	0.24	0.19	0.16	0.14	0.12					
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35					
	Z-25°C/Z+20°C	2	2	2	2	2					
	Z-55°C/Z+20°C	3	3	3	3	3					
Load life (after application of the rated voltage for 2000 hours at 105°C)	Leakage current	Less than specified value									
	Capacitance change	Within $\pm 25\%$ of initial value									
	$\tan\delta$	Less than 200% of specified value									
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4										
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.										
	Leakage current	Less than specified value									
	Capacitance change	Within $\pm 10\%$ of initial value									
	$\tan\delta$	Less than specified value									

### DRAWING -Series code of CZ is "Y"

Unit : mm



# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

## CZ series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$	WV	6.3			10			16			25			35		
33								6.3×5.8	0.39	384	6.3×5.8	0.39	384	6.3×5.8	0.43	384
47				6.3×5.8	0.36	384	6.3×5.8	0.39	384	6.3×5.8	0.39	384	6.3×5.8	0.43	464	
68	6.3×5.8	0.43	384	6.3×5.8	0.36	384	6.3×5.8	0.36	384	6.3×5.8	0.36	384	6.3×7.7	0.32	600	
100	6.3×5.8	0.43	384	6.3×5.8	0.36	384	6.3×5.8	0.36	384	6.3×7.7	0.32	600				
										8×6.2	0.26	500		8×10	0.16	960
150	6.3×5.8	0.43	384	6.3×5.8	0.36	384	6.3×7.7	0.32	600	8×10	0.16	960	8×10	0.16	960	
220	6.3×5.8	0.43	384	6.3×7.7	0.32	600	6.3×7.7	0.32	600				8×10	0.16	960	
				8×6.2	0.26	500	8×6.2	0.26	500					10×10	0.10	1360
330	6.3×7.7	0.32	600				8×10	0.16	960	8×10	0.16	960	10×10	0.10	1360	
	8×6.2	0.26	500													
470	8×10	0.16	960	8×10	0.16	960	10×10	0.08	1360	10×10	0.10	1360				
680	8×10	0.16	960	10×10	0.08	1360										
1000	10×10	0.08	1360													
1500	10×10	0.08	1360													

Ripple current (mA rms) at 105°C, 100kHz

Impedance ( $\Omega$ ) at 20°C, 100kHz

Case size ØD x L (mm)

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz
Coefficient	0.35	0.50	0.64	0.83	1.00

# CM Chip type, Extremely Low Impedance Long Life Series

**L** Low Impedance    **S** Solvent Proof

CD → CM  
Long life



- Chip type, low impedance temperature range up to 105°C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

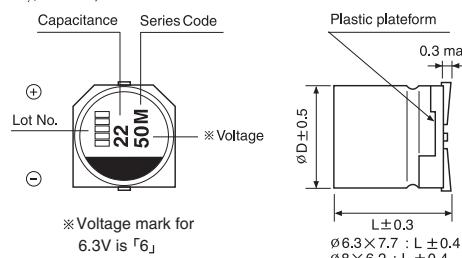
Item	Characteristics														
<b>Operating temperature range</b>	-55 ~ +105°C														
<b>Leakage current max.</b>	$I = 0.01\text{CV}$ or $3\mu\text{A}$ whichever is greater (after 2 minutes)														
<b>Capacitance tolerance</b>	$\pm 20\%$ at 120Hz, 20°C														
<b>Dissipation factor max. (at 120Hz, 20°C)</b>	WV	6.3	10	16	25	35	50	63 ~ 100							
	$\tan\delta$	0.26	0.19	0.16	0.14	0.13	0.12	0.10							
<b>Low temperature characteristics (Impedance ratio at 120Hz)</b>	WV	6.3	10	16	25	35	50	50 ~ 100							
	Z-25°C/Z+20°C	2	2	2	2	2	2	2							
	Z-55°C/Z+20°C	4	4	4	3	3	3	3							
<b>Load life (after application of the rated voltage for 5000 hours at 105°C)</b>	Leakage current	Less than specified value													
	Capacitance change	Within $\pm 30\%$ of initial value													
	$\tan\delta$	Less than 250% of specified value													
	$\varnothing D$	$\varnothing D \leq 6.3, \varnothing 8 \times 6.2\text{mmL}$			$\varnothing D \geq 8$										
	Life time	3000 hours			5000 hours										
<b>Shelf life (at 105°C)</b>	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4														
<b>Resistance to soldering heat</b>	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.														
	Leakage current	Less than specified value													
	Capacitance change	Within $\pm 10\%$ of initial value													
	$\tan\delta$	Less than specified value													

## DRAWING

Unit : mm

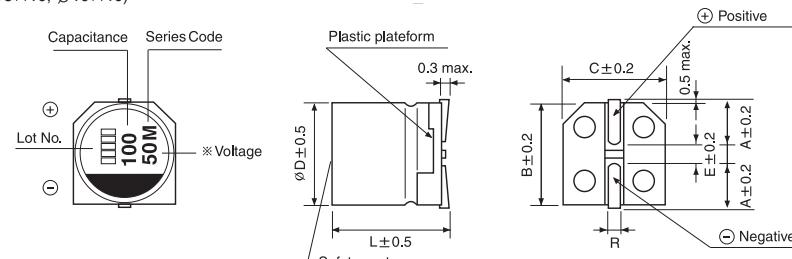
-Series code of CM is "M"

( $\varnothing 6.3, \varnothing 8 \times 6.2$ )

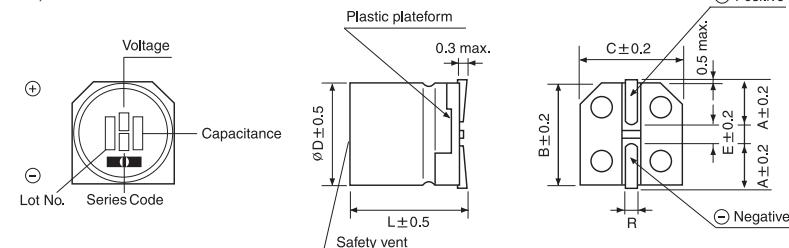


$\varnothing D \times L$	A	B	C	E	R
<b>6.3 × 5.8</b>	2.4	6.6	6.6	2.2	0.5~0.8
<b>6.3 × 7.7</b>	2.4	6.6	6.6	2.2	0.5~0.8
<b>8 × 6.2</b>	3.3	8.3	8.3	2.3	0.5~0.8
<b>8 × 10</b>	2.9	8.3	8.3	3.1	0.8~1.1
<b>10 × 10</b>	3.2	10.3	10.3	4.5	0.8~1.1
<b>12.5 × 13.5</b>	4.6	12.8	12.8	4.5	0.8~1.4

( $\varnothing 8 \times 10, \varnothing 10 \times 10$ )



( $\varnothing 12.5$ )



# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

## CM series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$	WV	6.3			10			16			25			35			50		
10																	6.3×5.8	1.00	170
15																	6.3×5.8	0.86	170
22																	6.3×5.8	0.86	170
33								6.3×5.8	0.43	240	6.3×5.8	0.43	240	6.3×5.8	0.50	240	6.3×7.7	0.66	280
																	8×6.2	0.63	300
47				6.3×5.8	0.43	240	6.3×5.8	0.43	240	6.3×5.8	0.43	240	6.3×5.8	0.50	240	6.3×7.7	0.66	280	
																	8×6.2	0.63	300
68	6.3×5.8	0.43	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×7.7	0.32	290	8×10	0.32	350	
100	6.3×5.8	0.43	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×7.7	0.32	290		8×10	0.16	600	10×10	0.2	700
																	8×6.2	0.26	300
150	6.3×5.8	0.43	240	6.3×5.8	0.39	240	6.3×7.7	0.32	290	8×10	0.16	600	8×10	0.16	600				
220	6.3×5.8	0.43	240	6.3×7.7	0.36	290	6.3×7.7	0.32	290		8×10	0.16	600	10×10	0.08	850			
330	6.3×7.7	0.32	290		8×10	0.16	600	8×10	0.16	600	10×10	0.1	850						
470	8×10	0.16	600	8×10	0.16	600	10×10	0.08	850										
680	8×10	0.16	600	10×10	0.08	850													
1000	10×10	0.08	850																

↑      ↑

Ripple current (mA rms) at 105°C, 100kHz

Impedance ( $\Omega$ ) at 20°C, 100kHz

Case size  $\varnothing D \times L$  (mm)

$\mu\text{F}$	WV	63			80			100		
10		6.3×7.7	2.1	80	6.3×7.7	2.4	60	8×10	2	100
22		6.3×7.7	2.1	120	8×10	1.3	130	8×10	2	140
33		8×10	1.0	250	8×10	1.3	130	10×10	1.5	330
47		8×10	1.0	250	10×10	1.0	200	12.5×13.5	1.0	500
68		10×10	0.8	400	12.5×13.5	0.8	500	12.5×13.5	1.0	500
100		10×10	0.8	400	12.5×13.5	0.8	500			
150		12.5×13.5	0.6	800	12.5×13.5	0.8	500			
220		12.5×13.5	0.6	800						

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz
Coefficient	0.35	0.5	0.64	0.83	1.00

# UC

Chip type, High Reliability  
Series

- Chip type, high temperature range, for 125°C use
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

Solvent Proof  
WV ≤ 100V

RC → UC  
High Temp.



Item	Characteristics														
Operating temperature range	-40 ~ +125°C														
Leakage current max.	WV ≤ 100 I = 0.03CV or $4\mu A$ whichever is greater (after 2 minutes) WV ≥ 160 I = 0.04CV + $100\mu A$ (after 1 minutes)														
Capacitance tolerance	±20% at 120Hz, 20°C														
Dissipation factor max. (at 120Hz, 20°C)	WV	10	16	25	35~63	80~100	160~200	250~400							
	$\tan\delta$	0.32	0.24	0.21	0.18	0.12	0.2	0.24							
Low temperature characteristics (Impedance ratio at 120Hz)	WV	10	16	25	35~63	80~100	160~200	250~400							
	Z-25°C/Z+20°C	8	6	4	4	3	3	6							
	Z-40°C/Z+20°C	12	8	6	4	4	6	10							
Load life (after application of the rated voltage for 2000 hours at 125°C)	Leakage current	Less than specified value													
	Capacitance change	Within ±30% of initial value													
	$\tan\delta$	Less than 300% of specified value													
Shelf life (at 125°C)	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4														
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.														
	Leakage current	Less than specified value													
	Capacitance change	Within ±10% of initial value													
	$\tan\delta$	Less than specified value													

● DRAWING (See page 62)

Unit : mm

-Series code of UC is "U"

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F \backslash WV$	10	16	25	35	50	63
10					8×6.2	65
22					8×6.2	65
33				8×6.2	65	8×10
47			8×6.2	65	8×10	125
68		8×6.2	65	8×6.2	65	10×10
100	8×6.2	65	8×10	125	10×10	200
220	8×10	125	10×10	200	10×10	200
330	10×10	200	10×10	200	12.5×13.5	525
470	10×10	200	12.5×13.5	525		
1000	12.5×13.5	525				

↑ ↑ Ripple current (mA rms) at 125°C, 120Hz  
Case size ØD×L(mm)

$\mu F \backslash WV$	80	100	160	200	250	400
3.3						12.5×13.5
4.7					45	12.5×13.5
10	8×10	45	8×10	45	10×10	45
22	8×10	45	10×10	80	12.5×13.5	85
33	10×10	80	10×10	80		
47	10×10	80	12.5×13.5	300		
68	12.5×13.5	300	12.5×13.5	300		

↑ ↑ Ripple current (mA rms) at 125°C, 120Hz  
Case size ØD×L(mm)

● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz
Coefficient	0.70	1.00	1.17	1.36	1.50

# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

## UR Chip type, High Reliability Series

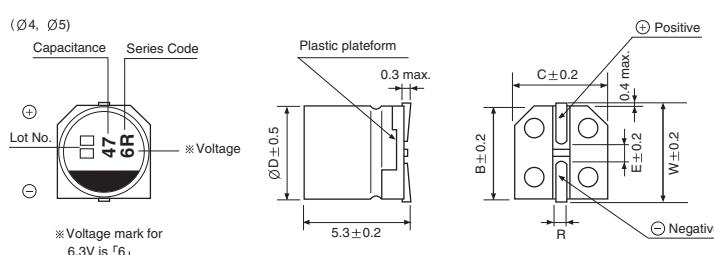


- Chip type, high temperature range, for 125°C use
- Lower ESR than UC series
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Application to automotive system
- Complied to the RoHS directive

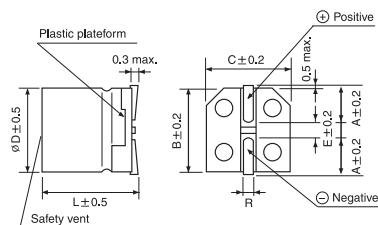
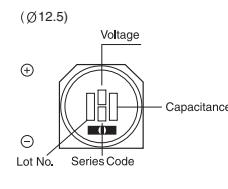
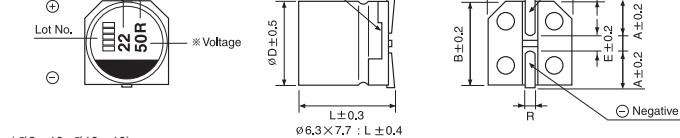
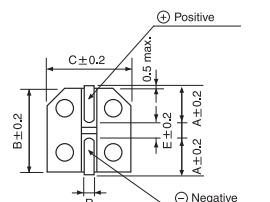
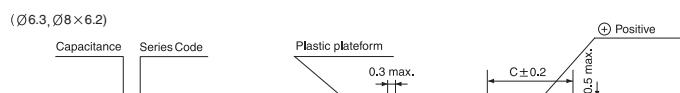
Item	Characteristics																																																																																
<b>Operating temperature range</b>	-40 ~ +125°C																																																																																
<b>Leakage current max.</b>	<table border="1"> <tr> <td>WV ≤ 100</td> <td colspan="4">WV ≥ 160</td></tr> <tr> <td>I = 0.01CV or 3μA whichever is greater (after 2 minutes)</td><td colspan="4">I = 0.04CV + 100μA (after 2 minutes)</td></tr> </table>									WV ≤ 100	WV ≥ 160				I = 0.01CV or 3μA whichever is greater (after 2 minutes)	I = 0.04CV + 100μA (after 2 minutes)																																																																	
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I = 0.01CV or 3μA whichever is greater (after 2 minutes)	I = 0.04CV + 100μA (after 2 minutes)																																																																																
<b>Capacitance tolerance</b>	±20% at 120Hz, 20°C																																																																																
<b>Dissipation factor max. (at 120Hz, 20°C)</b>	<table border="1"> <tr> <td>WV</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50~80</td><td>100</td><td>160~250</td><td>400</td></tr> <tr> <td>tanδ</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>0.20</td><td>0.24</td></tr> </table>									WV	10	16	25	35	50~80	100	160~250	400	tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.20	0.24																																																						
WV	10	16	25	35	50~80	100	160~250	400																																																																									
tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.20	0.24																																																																									
<b>Temperature characteristics (Impedance ratio at 120Hz)</b>	<table border="1"> <tr> <td>WV</td><td>10</td><td>16</td><td>25</td><td>35~100</td><td>160~250</td><td>400</td><td></td><td></td></tr> <tr> <td>Z-25°C/Z+20°C</td><td>3</td><td>2</td><td>2</td><td>2</td><td>3</td><td>6</td><td></td><td></td></tr> <tr> <td>Z-40°C/Z+20°C</td><td>4</td><td>3</td><td>3</td><td>3</td><td>6</td><td>10</td><td></td><td></td></tr> </table>									WV	10	16	25	35~100	160~250	400			Z-25°C/Z+20°C	3	2	2	2	3	6			Z-40°C/Z+20°C	4	3	3	3	6	10																																															
WV	10	16	25	35~100	160~250	400																																																																											
Z-25°C/Z+20°C	3	2	2	2	3	6																																																																											
Z-40°C/Z+20°C	4	3	3	3	6	10																																																																											
<b>Load life (after application of the rated voltage for 5000 hours at 125°C)</b>	<table border="1"> <tr> <td>Leakage current</td><td colspan="8">Less than specified value</td></tr> <tr> <td>Capacitance change</td><td colspan="8">Within ±30% of initial value</td></tr> <tr> <td>tanδ</td><td colspan="8">Less than 300% of specified value</td></tr> <tr> <td>ØD</td><td colspan="2">~ 80V</td><td colspan="2">100V</td><td colspan="4">160V ~</td></tr> <tr> <td>ØD = 4, 5, 6.3</td><td colspan="2">1000 hours</td><td colspan="2">-</td><td colspan="4">-</td></tr> <tr> <td>8×6.2</td><td colspan="2">3000 hours</td><td colspan="2">-</td><td colspan="4">-</td></tr> <tr> <td>ØD = 8, 10</td><td colspan="2">5000 hours</td><td colspan="2">2000 hours</td><td colspan="4">2000 hours</td></tr> <tr> <td>ØD = 12.5</td><td colspan="2">5000 hours</td><td colspan="2" rowspan="7">5000 hours</td><td colspan="4" rowspan="7">2000 hours</td></tr> </table>									Leakage current	Less than specified value								Capacitance change	Within ±30% of initial value								tanδ	Less than 300% of specified value								ØD	~ 80V		100V		160V ~				ØD = 4, 5, 6.3	1000 hours		-		-				8×6.2	3000 hours		-		-				ØD = 8, 10	5000 hours		2000 hours		2000 hours				ØD = 12.5	5000 hours		5000 hours		2000 hours			
Leakage current	Less than specified value																																																																																
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ØD = 8, 10	5000 hours		2000 hours		2000 hours																																																																												
ØD = 12.5	5000 hours		5000 hours		2000 hours																																																																												
<b>Shelf life (at 125°C)</b>	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384-4																																																																																
<b>Resistance to soldering heat</b>	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.																																																																																
	<table border="1"> <tr> <td>Leakage current</td><td colspan="8">Less than specified value</td></tr> <tr> <td>Capacitance change</td><td colspan="8">Within ±10% of initial value</td></tr> <tr> <td>tanδ</td><td colspan="8">Less than specified value</td></tr> </table>									Leakage current	Less than specified value								Capacitance change	Within ±10% of initial value								tanδ	Less than specified value																																																				
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Capacitance change	Within ±10% of initial value																																																																																
tanδ	Less than specified value																																																																																

### DRAWING - Series code of UR is "R"

Unit : mm



ØD×L	W	A	B	C	E	R
4×5.3	4.8		4.3	4.3	1.0	0.5~0.8
5×5.3	5.8		5.3	5.3	1.4	0.5~0.8
6.3×5.3		2.4	6.6	6.6	2.2	0.5~0.8
6.3×5.8	2.4	6.6	6.6	2.2	0.5~0.8	
6.3×7.7	2.4	6.6	6.6	2.2	0.5~0.8	
8×6.2	3.3	8.3	8.3	2.3	0.5~0.8	
8×10	2.9	8.3	8.3	3.1	0.8~1.1	
10×10	3.2	10.3	10.3	4.5	0.8~1.1	
12.5×13.5	4.6	12.8	12.8	4.5	0.8~1.4	



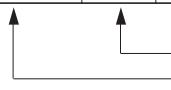
# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

## UR series

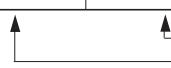
### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$	WV	10			16			25			35		
10					4×5.3	7.00	12	5×5.3	3.30	23	6.3×5.8	1.60	69
22	5×5.3	3.30	23		5×5.3	3.30	23	6.3×5.3	2.00	40	6.3×5.8	1.60	69
33	5×5.3	3.30	23	6.3×5.3	2.00	40	6.3×5.8	1.60	69	8×6.2	0.90	110	
47	6.3×5.3	2.00	40	6.3×5.8	1.60	69	8×6.2	0.90	110	8×10	0.30	264	
100	8×6.2	0.90	110	8×6.2	0.90	110	8×10	0.30	264	8×10	0.30	264	
220	8×10	0.30	264	8×10	0.30	355	8×10	0.30	355	10×10	0.20	400	
330	8×10	0.30	355	10×10	0.20	400	10×10	0.20	400	12.5×13.5	0.14	750	
							12.5×13.5	0.14	750				
470	10×10	0.20	400	12.5×13.5	0.14	750							

$\mu\text{F}$	WV	50			63			80			100		
10	6.3×5.8	2.80	51		8×6.2	2.00	60	8×10	1.20	70	8×10	1.60	70
22	8×6.2	1.60	83		8×10	1.00	70	10×10	0.55	115	10×10	1.60	95
33	8×10	0.70	192		10×10	0.55	115	10×10	0.55	115	10×10	0.80	115
47	10×10	0.50	330		10×10	0.55	115	12.5×13.5	0.33	450	12.5×13.5	0.33	450
100	10×10	0.50	330	12.5×13.5	0.33	450	12.5×13.5	0.33	450	12.5×13.5	0.33	450	
220	12.5×13.5	0.23	550										
330													
470													


 Ripple current (mA rms) at 125°C, 100kHz  
 ESR ( $\Omega$ ) at 20°C, 100kHz  
 Case size  $\varnothing D \times L$  (mm)

$\mu\text{F}$	WV	160			200			250			400		
1											10×10		18
2.2											10×10		26
3.3											10×10		37
4.7								12.5×13.5	70		12.5×13.5		70
10	12.5×13.5		100		12.5×13.5		100	12.5×13.5		100			
22	12.5×13.5		120		12.5×13.5		120						


 Ripple current (mA rms) at 125°C, 120Hz  
 Case size  $\varnothing D \times L$  (mm)

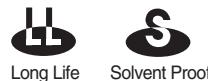
### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency		120Hz	1kHz	10kHz	100kHz
WV	cap.				
$\leq 100$	~ 10	0.66	0.86	0.93	1.00
	22 ~	0.93	0.97	1.00	1.00
160 ≤	-	1.00	1.50	1.75	1.80

# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

**CF**

Chip type, High Temperature, Long Life,  
Series



- Chip type, high temperature range, for 130°C use
- For ECU
- Application to automatic insertion machine using carrier
- Complied to the RoHS directive

Item	Characteristics								
<b>Operating temperature range</b>	-40 ~ +130°C								
<b>Leakage current</b>	$I = 0.03CV$ or $4\mu A$ whichever is greater (after 2 minutes)								
<b>Capacitance tolerance</b>	$\pm 20\%$ at 120Hz, 20°C								
<b>Dissipation factor max. (at 120Hz, 20°C)</b>	Rated Voltage(V)	10	16	25	35	50			
	$\tan\delta$	0.32	0.24	0.21	0.18	0.18			
<b>Low temperature characteristics (Impedance ratio at 120Hz)</b>	WV	10	16	25	35	50			
	Z-25°C/Z+20°C	8	6	4	4	4			
	Z-40°C/Z+20°C	12	11	8	6	6			
<b>Load life</b> <b>(after application of the rated voltage for 5000 hours at 130°C)</b>	Leakage current	Less than specified value							
	Capacitance change	Within $\pm 30\%$ of initial value							
	$\tan\delta$	Less than 300% of the specified value							
	$\emptyset D$	$\emptyset 8 \times 6.2\text{mmL}$		$\emptyset 8 \times 10\text{mmL}$	$\emptyset D \geq 10$				
<b>Shelf life (at 130°C)</b>	Life time	2000 hours		3000 hours	5000 hours				
	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4								
<b>Resistance to soldering heat</b>	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.								
	Leakage current	Less than specified value							
	Capacitance change	Within $\pm 10\%$ of initial value							
	$\tan\delta$	Less than specified value							

## ● DRAWING (See page 62)

Unit : mm

-Series code of CF is "H"

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	10	16	25	35	50		
22							$8 \times 6.2$	28
33					$8 \times 6.2$	41	$8 \times 10$	75
47					$10 \times 10$	90	$10 \times 10$	90
68		$8 \times 6.2$	50	$8 \times 6.2$	45	$10 \times 10$	105	$12.5 \times 13.5$
100	$8 \times 6.2$	48	$8 \times 10$	66	$10 \times 10$	163	$10 \times 10$	132
220	$8 \times 10$	90	$10 \times 10$	163	$10 \times 10$	200	$12.5 \times 13.5$	249
330	$10 \times 10$	125	$10 \times 10$	200	$12.5 \times 13.5$	304		
470	$10 \times 10$	150	$12.5 \times 13.5$	304				
1000	$12.5 \times 13.5$	405						

Ripple current (mA rms) at 130°C, 120Hz  
Case size  $\emptyset D \times L$ (mm)

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz
Coefficient	0.70	1.00	1.17	1.36	1.50

New



Chip type, High Temperature  
Series

- Chip type, high temperature range, for +135°C use
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

CF → KC  
High Temp.



Item	Characteristics										
Operating temperature range	-40 ~ +135°C										
Leakage current max.	$I = 0.01CV$ or $3\mu A$ whichever is greater (after 2 minutes)										
Capacitance tolerance	$\pm 20\%$ ( 20°C, 120Hz)										
Dissipation factor max. (at 120Hz, 20°C)	WV	10	16	25	35	50					
	$\tan\delta$	0.30	0.23	0.18	0.16	0.16					
Low temperature characteristics (Impedance ratio at 120Hz)	WV	10	16	25	35	50					
	Z-25°C/Z+20°C	8	6	4	4	4					
	Z-40°C/Z+20°C	12	8	6	4	4					
Load life (after application of the rated voltage for 2000 hours at 135°C)	Leakage Current	Less than specified value									
	Capacitance Change	Within $\pm 30\%$ of initial value									
	$\tan\delta$	Less than 300% of specified value									
Shelf life (at 135°C)	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4										
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.										
	Leakage Current	Less than specified value									
	Capacitance Change	Within $\pm 10\%$ of initial value									
	$\tan\delta$	Less than specified value									

### ● DRAWING (See page 62)

Unit : mm

-Series code of KC is "C"

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	10			16			25			35			50		
47											8×10	0.20	270	8×10	0.25	270
68											8×10	0.20	270	8×10		
100					8×10	0.20	270	8×10	0.20	270	8×10	0.20	270	10×10	0.20	500
220	8×10	0.20	270	8×10	0.20	270	10×10	0.15	500	10×10	0.15	500	10×10			
330	10×10	0.20	270	10×10	0.15	500	10×10	0.15	500	10×10			10×10			
470	10×10	0.15	500	10×10	0.15	500	← Ripple current (mA rms) at 135°C, 100kHz									

↑ ESR ( $\Omega$ ) at 20°C, 100kHz  
↑ Case size  $\varnothing D \times L$ (mm)

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz
Coefficient	0.35	0.50	0.64	0.83	1.00

# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

## CW Chip type, High Reliability Series



- Chip type, high temperature range, for 150°C use
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

CF → CW  
High Temp.

Item	Characteristics										
<b>Operating temperature range</b>	-40 ~ +150°C										
<b>Leakage current</b>	$I = 0.03CV$ or $4\mu A$ whichever is greater (after 2 minutes)										
<b>Capacitance tolerance</b>	$\pm 20\%$ at 120Hz, 20°C										
<b>Dissipation factor max. (at 120Hz, 20°C)</b>	WV	10	16	25	35	50					
	$\tan\delta$	0.30	0.20	0.16	0.14	0.14					
<b>Low temperature characteristics (Impedance ratio at 120Hz)</b>	WV	10	16	25	35	50					
	Z-25°C/Z+20°C	8	6	4	4	4					
	Z-40°C/Z+20°C	12	10	8	6	6					
<b>Load life (after application of the rated voltage for 1000 hours at 150°C)</b>	Leakage current	Less than specified value									
	Capacitance change	Within $\pm 30\%$ of initial value									
	$\tan\delta$	Less than 300% of the specified value									
<b>Shelf life (at 150°C)</b>	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4										
<b>Resistance to soldering heat</b>	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.										
	Leakage current	Less than specified value									
	Capacitance change	Within $\pm 10\%$ of initial value									
	$\tan\delta$	Less than specified value									

### ● DRAWING (See page 62)

Unit : mm

-Series code of CW is "W"

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	10	16	25	35	50		
33							10×10	75
47							10×10	90
68							10×10	105
100				10×10	160	10×10	132	12.5×13.5
220			10×10	163	10×10	200	12.5×13.5	249
330	10×10	183	10×10	200	12.5×13.5	304		
470	10×10	218	12.5×13.5	304				
1000	12.5×13.5	405						

Ripple current (mA rms) at 150°C, 120Hz  
Case size ØD×L(mm)

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz
Coefficient	0.70	1.00	1.17	1.36	1.50

# NC

 Chip type, Non-polarized Series


SC → NC → CN  
Non-polar      Wide temp.



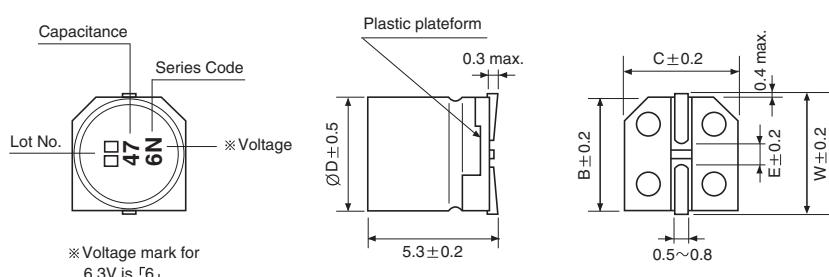
- Chip type with 5.5mmL height
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

Item	Characteristics												
Operating temperature range	-40 ~ +85°C												
Leakage current max.	$I = 0.05CV$ or $10\mu A$ whichever is greater (after 2 minutes)												
Capacitance tolerance	$\pm 20\%$ at 120Hz, 20°C												
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50						
	$\tan\delta$	0.24	0.20	0.17	0.17	0.15	0.15						
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50						
	Z-25°C/Z+20°C	4	3	2	2	2	2						
	Z-40°C/Z+20°C	8	6	4	4	3	3						
Load life (after application of the rated voltage for 2000 hours at 85°C)	Leakage current	Less than specified value											
	Capacitance change	Within $\pm 20\%$ of initial value											
	$\tan\delta$	Less than 200% of specified value											
	Test method	Polarity reverse each 250 hours											
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4												
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.												
	Leakage current	Less than specified value											
	Capacitance change	Within $\pm 10\%$ of initial value											
	$\tan\delta$	Less than specified value											

Unit : mm

## DRAWING

-Series code of NC is "N"



ØD	W	B	C	E
4	4.8	4.3	4.3	1.0
5	5.8	5.3	5.3	1.4
6.3	7.1	6.6	6.6	2.2

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F \backslash WV$	6.3	10	16	25	35	50
1.0						4×5.3 8.4
2.2					4×5.3	8.4
3.3				5×5.3 12	5×5.3	16
4.7			4×5.3 12	5×5.3 16	5×5.3 18	6.3×5.3 20
10		4×5.3 17	5×5.3 23	6.3×5.3 27	6.3×5.3 29	
22	5×5.3 28	6.3×5.3 33	6.3×5.3 37			
33	6.3×5.3 37	6.3×5.3 41	6.3×5.3 49			
47	6.3×5.3 45					

Ripple current (mA rms) at 85°C, 120Hz  
Case size ØD × L (mm)

# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

**CN**

Height 5.5mmL, 105°C Non-polarized Series



NC → CN  
Wide temp.

- Chip type, Non-polarized, Wide temperature 105°C
- Chip type with 5.5mmL height
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

Item	Characteristics												
<b>Operating temperature range</b>	$WV \leq 25 : -55 \sim +105^{\circ}C$ $WV \geq 35 : -40 \sim +105^{\circ}C$												
<b>Leakage current max.</b>	$I = 0.05CV$ or $10\mu A$ whichever is greater (after 2 minutes)												
<b>Capacitance tolerance</b>	$\pm 20\%$ at 120Hz, 20°C												
<b>Dissipation factor max. (at 120Hz, 20°C)</b>	WV	6.3	10	16	25	35	50						
	$\tan\delta$	0.32	0.26	0.24	0.20	0.18	0.18						
<b>Low temperature characteristics (impedance ratio at 120Hz)</b>	WV	6.3	10	16	25	35	50						
	Z-25°C/Z+20°C	4	3	2	2	2	2						
	Z-40°C/Z+20°C	-	-	-	-	4	4						
	Z-55°C/Z+20°C	8	5	4	3	-	-						
<b>Load life (after application of the rated voltage for 1000 hours at 105°C)</b>	Leakage current	Less than specified value											
	Capacitance change	Within $\pm 20\%$ of initial value											
	$\tan\delta$	Less than 200% of specified value											
	Test method	Polarity reverse each 250 hours											
<b>Shelf life (at 105°C)</b>	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4												
<b>Resistance to soldering heat</b>	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.												
	Leakage current	Less than specified value											
	Capacitance change	Within $\pm 10\%$ of initial value											
	$\tan\delta$	Less than specified value											

## ● DRAWING (See page 89)

Unit : mm

-Series code of CN is "C"

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	6.3	10	16	25	35	50
1.0							
2.2						4×5.3	8.4
3.3					5×5.3	12	5×5.3
4.7				4×5.3	12	5×5.3	16
10			4×5.3	17	5×5.3	23	6.3×5.3
22	5×5.3	28	6.3×5.3	33	6.3×5.3	37	
33	6.3×5.3	37	6.3×5.3	41	6.3×5.3	49	
47	6.3×5.3	45					

↑      ↑  
Ripple current (mA rms) at 105°C, 120Hz  
Case size ØD × L (mm)