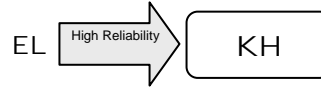
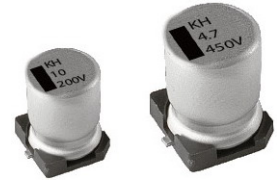


## HIGH RELIABILITY

- High temperature range up to +125°C
- Suitable for automotive equipment
- Load life of 1000~5000 hours
- Comply with the RoHS directive



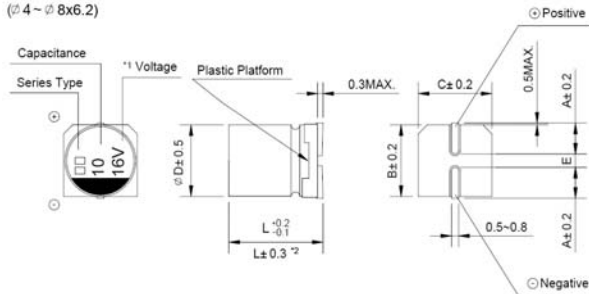
RoHS

### SPECIFICATIONS

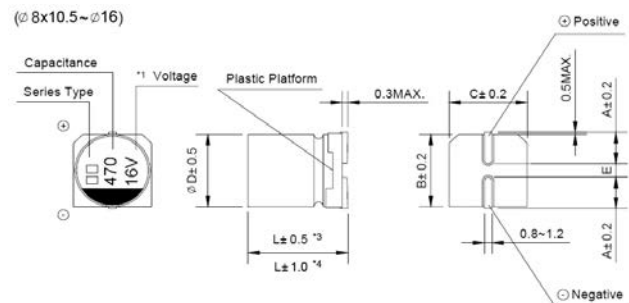
Items	Characteristics																																					
Operation Temperature Range	-40 ~ +125°C																																					
Voltage Range	10 ~ 450V																																					
Capacitance Range	3.3 ~ 2200μF																																					
Capacitance Tolerance	±20% at 120Hz, 20°C																																					
Leakage Current	Leakage current (10V~100V) ≅ 0.03CV or 4μA, whichever is greater (after 2 minutes application of rated voltage) Leakage current (160V~450V) ≅ 0.04CV or 100μA, whichever is greater (after 2 minutes application of rated voltage)																																					
Dissipation Factor (tan δ)	Measurement frequency : 120Hz, Temperature : 20°C <table border="1"> <thead> <tr> <th>Rated Voltage (V)</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> <th>160~250</th> <th>400,450</th> </tr> </thead> <tbody> <tr> <td rowspan="2">tan δ (max.)</td> <td>∅4~∅10</td> <td>0.24</td> <td>0.20</td> <td>0.16</td> <td>0.14</td> <td>0.14</td> <td>0.18</td> <td>0.18</td> <td>—</td> </tr> <tr> <td>∅12.5~∅16</td> <td>0.22</td> <td>0.18</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.14</td> <td>0.10</td> <td>0.20</td> </tr> </tbody> </table>	Rated Voltage (V)	10	16	25	35	50	63	100	160~250	400,450	tan δ (max.)	∅4~∅10	0.24	0.20	0.16	0.14	0.14	0.18	0.18	—	∅12.5~∅16	0.22	0.18	0.16	0.14	0.12	0.14	0.10	0.20								
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Stability at Low Temperature	Measurement frequency : 120Hz <table border="1"> <thead> <tr> <th colspan="2">Rated Voltage (V)</th> <th>10</th> <th>16</th> <th>25</th> <th>35~100</th> <th>160~250</th> <th>400,450</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Impedance Ratio</td> <td>∅4~∅10</td> <td>Z(-25°C) / Z(20°C)</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>—</td> </tr> <tr> <td></td> <td>Z(-40°C) / Z(20°C)</td> <td>10</td> <td>8</td> <td>6</td> <td>4</td> <td>—</td> </tr> <tr> <td rowspan="2">ZT/Z20 (max.)</td> <td rowspan="2">∅12.5~∅16</td> <td>Z(-25°C) / Z(20°C)</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>3</td> </tr> <tr> <td>Z(-40°C) / Z(20°C)</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>6</td> </tr> </tbody> </table>	Rated Voltage (V)		10	16	25	35~100	160~250	400,450	Impedance Ratio	∅4~∅10	Z(-25°C) / Z(20°C)	4	3	2	2	—		Z(-40°C) / Z(20°C)	10	8	6	4	—	ZT/Z20 (max.)	∅12.5~∅16	Z(-25°C) / Z(20°C)	4	3	2	2	3	Z(-40°C) / Z(20°C)	8	6	4	3	6
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		Z(-40°C) / Z(20°C)	8	6	4	3	6																															
Load Life	After 5000 hrs. application of the rated voltage for ∅12.5×16 (10~100V), and 2000 hrs. for ∅8×10.5~∅10 (10~100V), and 1000 hrs. for ∅8×6.2~∅6.3, as well as 2000 hrs. application of rated voltage for ∅12.5×16 (160~450V) at 125°C, they meet the characteristics listed below. <table border="1"> <tbody> <tr> <td>Capacitance Change</td> <td>Within ±30% of initial value</td> </tr> <tr> <td>Dissipation Factor</td> <td>300% or less of initial specified value</td> </tr> <tr> <td>Leakage Current</td> <td>initial specified value or less</td> </tr> </tbody> </table>	Capacitance Change	Within ±30% of initial value	Dissipation Factor	300% or less of initial specified value	Leakage Current	initial specified value or less																															
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Shelf Life	After leaving capacitors under no load at 125°C for 1000 hours, they meet the specified value for load life characteristics listed above.																																					
Resistance to Soldering Heat	After reflow soldering and restored at room temperature, they meet the characteristics listed below. <table border="1"> <tbody> <tr> <td>Capacitance Change</td> <td>Within ±10% of initial value</td> </tr> <tr> <td>Dissipation Factor</td> <td>initial specified value or less</td> </tr> <tr> <td>Leakage Current</td> <td>initial specified value or less</td> </tr> </tbody> </table>	Capacitance Change	Within ±10% of initial value	Dissipation Factor	initial specified value or less	Leakage Current	initial specified value or less																															
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Leakage Current	initial specified value or less																																					
Marking	Black print on the case top.																																					

### DRAWING (Unit: mm)

(∅4~∅8x6.2)



(∅8x10.5~∅16)



\*1. Voltage mark for 6.3V is [6V]  
\*2. Applicable to ∅6.3×7.7

\*3. Applicable to ∅8×10.5~∅10  
\*4. Applicable to ∅12.5~∅16

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□ DIMENSIONS (Unit: mm)

∅D x L	4 x 5.4	5 x 5.4	6.3 x 5.8	6.3 x 7.7	8 x 6.2	8 x 10.5	10 x 10.5	10 x 13.5	12.5 x 13.5	12.5 x 16	16 x 16.5
A	1.8	2.1	2.4	2.4	3.3	2.9	3.2	3.2	4.7	4.7	5.5
B	4.3	5.3	6.6	6.6	8.3	8.3	10.3	10.3	13.0	13.0	17.0
C	4.3	5.3	6.6	6.6	8.3	8.3	10.3	10.3	13.0	13.0	17.0
E ± 0.2	1.0	1.3	2.2	2.2	2.2	3.1	4.4	4.4	4.4	4.4	6.7
L	5.4	5.4	5.4	7.7	6.2	10.5	10.5	13.5	13.5	16.0	16.5

□ DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT & ESR

WV		10 (1A)				16 (1C)				25 (1E)			
Parameter	μF	Case size ∅DxL (mm)	E.S.R. (Ω)		Ripple current (mA rms) at 125°C 100KHz	Case size ∅DxL (mm)	E.S.R. (Ω)		Ripple current (mA rms) at 125°C 100KHz	Case size ∅DxL (mm)	E.S.R. (Ω)		Ripple current (mA rms) at 125°C 100KHz
			20°C E.S.R.	-40°C E.S.R.			20°C E.S.R.	-40°C E.S.R.			20°C E.S.R.	-40°C E.S.R.	
33	330									6.3 x 5.8	3.3	66	45
47	470				6.3 x 5.8	3.3	66	43		6.3 x 7.7 (8 x 6.2)	2.3 (2.3)	46 (46)	68 (68)
100	101	6.3 x 7.7 (8 x 6.2)	2.3 (2.3)	46 (46)	72 (72)	8 x 10.5	1.0	20	115	8 x 10.5	1.0	20	126
220	221	8 x 10.5	1.0	20	136	10 x 10.5	0.7	13.4	175	10 x 10.5	0.7	13.4	211
330	331	10 x 10.5	0.7	13.4	188	10 x 13.5	0.5	9.5	280	12.5 x 13.5 (10.5x13.5)	0.14 (0.5)	2.1 (9.5)	750 (270)
470	471	10 x 13.5	0.5	9.5	300	12.5 x 13.5	0.14	2.1	750	12.5 x 13.5	0.14	2.1	750
680	681					16 x 16.5 (12.5x13.5)	0.10 (0.14)	1.5 (2.1)	1000 (750)	16 x 16.5	0.10	1.5	1000
1000	102	12.5 x 16 (12.5x13.5)	0.11 (0.14)	1.5 (2.1)	900 (750)								
2200	222	16 x 16.5	0.10	1.5	1000								

WV		35 (1V)				50 (1H)			
Parameter	μF	Case size ∅DxL (mm)	E.S.R. (Ω)		Ripple current (mA rms) at 125°C 100KHz	Case size ∅DxL (mm)	E.S.R. (Ω)		Ripple current (mA rms) at 125°C 100KHz
			20°C E.S.R.	-40°C E.S.R.			20°C E.S.R.	-40°C E.S.R.	
10	100	6.3 x 5.8	3.3	66	38	6.3 x 7.7 (6.3 x 5.8)	2.3 (3.3)	46 (66)	50 (38)
22	220	6.3 x 5.8	3.3	66	39	6.3 x 7.7 (8 x 6.2)	2.3 (2.3)	46 (46)	50 (50)
33	330	6.3 x 7.7 (8 x 6.2)	2.3 (2.3)	46 (46)	62 (62)	8 x 10.5	1.0	20	83
47	470	8 x 10.5	1.0	20	92	10 x 10.5	0.7	13.4	111
100	101	10 x 10.5	0.7	13.4	151	12.5 x 13.5	0.23	3.5	550
220	221	12.5 x 13.5 (10 x 13.5)	0.14 (0.5)	2.1 (9.5)	750 (280)	16 x 16.5 (12.5 x 13.5)	0.15 (0.23)	2.3 (3.5)	850 (550)
330	331	12.5 x 13.5	0.14	2.1	750	16 x 16.5 (12.5 x 16)	0.15 (0.18)	2.3 (2.7)	850 (700)
470	471	16 x 16.5 (12.5 x 16)	0.10 (0.11)	1.5 (1.5)	1000 (900)				

WV		63 (1J)				100 (2A)			
Parameter	μF	Case size ∅DxL (mm)	E.S.R. (Ω)		Ripple current (mA rms) at 125°C 100KHz	Case size ∅DxL (mm)	E.S.R. (Ω)		Ripple current (mA rms) at 125°C 100KHz
			20°C E.S.R.	-40°C E.S.R.			20°C E.S.R.	-40°C E.S.R.	
10	100	6.3 x 7.7 (8 x 6.2)	2.3 (2.3)	115 (115)	42 (42)	8 x 10.5	1.00	50	53
22	220	8 x 10.5	1.0	50	56	10 x 10.5	0.70	35	63
33	330	10 x 10.5	0.7	35	77	10 x 13.5	0.45	22.5	130
47	470	10 x 13.5	0.45	22.5	150	12.5 x 13.5	0.33	16.5	450
68	680					12.5 x 16	0.26	13	550
100	101	12.5 x 13.5	0.25	12.5	500	16 x 16.5	0.24	12	650
220	221	12.5 x 16	0.20	10	600				
330	331	16 x 16.5	0.18	9	820				

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□ DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF	WV Code	160		200		250		400		450	
		2C		2D		2E		2G		2W	
3.3	3R3									12.5×16	65
4.7	4R7							12.5×13.5	70	16×16.5	85
6.8	6R8							16×16.5	100		
10	100	12.5×13.5	100	12.5×13.5	100	12.5×16	110			Case size	Ripple current
22	220	16×16.5	180	16×16.5	180						

•Case size ∅D×L(mm), ripple current (mA rms) at 125°C 120Hz

□ FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT

Frequency		50Hz	120Hz	1KHz	10KHz~	100KHz~	
Coefficient	10~100V	10 ~ 100μF	0.35	0.40	0.75	0.90	1.00
		220 ~ 470μF	0.35	0.50	0.85	0.94	1.00
		680 ~ 2200μF	0.40	0.60	0.85	0.95	1.00

Frequency		50Hz	120Hz	300Hz	1KHz	10KHz	100KHz~
Coefficient	160~450V	0.75	1.00	1.25	1.50	1.75	1.80

- Taping specifications are given in page 11.
- Please refer to page 12 for the minimum package quantity.

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