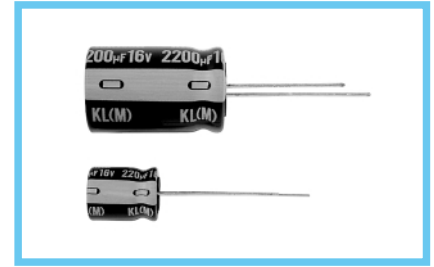
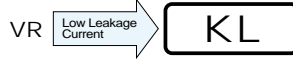


KL series Low Leakage Current



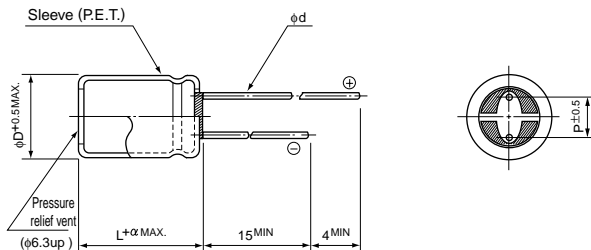
- Standard low leakage current series.
- Adapted to the RoHS directive (2002/95/EC).



Specifications

Item	Performance Characteristics																													
Category Temperature Range	-40 ~ +85°C (※ -40 ~ +105°C product also available upon request, but product rated at up to 50V less than or equal to $\phi 10 \times 12.5$ Lmm)																													
Rated Voltage Range	6.3 ~ 100V																													
Rated Capacitance Range	0.1 ~ 10000 μ F																													
Capacitance Tolerance	$\pm 20\%$ (M), $\pm 10\%$ (K) at 120Hz 20°C																													
Leakage Current	After 1 minute's (for case size 10×12.5 or smaller) or 2 minute's (for case size 10×16 or larger) application of rated voltage, leakage current is not more than 0.002CV or 0.2 (μ A) whichever is greater.																													
tan δ	<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>tan δ (MAX.)</td> <td>~$\phi 10 \times 12.5$</td> <td>0.18</td> <td>0.15</td> <td>0.12</td> <td>0.08</td> <td>0.08</td> <td>0.08</td> <td>0.07</td> <td>0.07</td> </tr> <tr> <td></td> <td>$\phi 10 \times 16 \sim$</td> <td>0.21</td> <td>0.17</td> <td>0.14</td> <td>0.12</td> <td>0.12</td> <td>0.10</td> <td>0.08</td> <td>0.08</td> </tr> </tbody> </table>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	tan δ (MAX.)	~ $\phi 10 \times 12.5$	0.18	0.15	0.12	0.08	0.08	0.08	0.07	0.07		$\phi 10 \times 16 \sim$	0.21	0.17	0.14	0.12	0.12	0.10	0.08	0.08
	Rated voltage (V)	6.3	10	16	25	35	50	63	100																					
tan δ (MAX.)	~ $\phi 10 \times 12.5$	0.18	0.15	0.12	0.08	0.08	0.08	0.07	0.07																					
	$\phi 10 \times 16 \sim$	0.21	0.17	0.14	0.12	0.12	0.10	0.08	0.08																					
	120Hz, 20°C For capacitance of more than 1000 μ F, add 0.02 for every increase of 1000 μ F.																													
stability at 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>Impedance ratio</td> <td>Z-25°C / Z+20°C</td> <td>3 (4)</td> <td>2 (3)</td> <td>2</td> <td>1.5</td> <td>1.5</td> <td>1.5</td> <td>1.5</td> <td>1.5</td> </tr> <tr> <td>ZT / Z20 (MAX.)</td> <td>Z-40°C / Z+20°C</td> <td>5 (8)</td> <td>4 (6)</td> <td>3 (4)</td> <td>2 (4)</td> <td>2 (3)</td> <td>2 (3)</td> <td>2 (3)</td> <td>2 (3)</td> </tr> </tbody> </table>	Rated voltage (V)	6.3	10	16	25	35	50	63	100	Impedance ratio	Z-25°C / Z+20°C	3 (4)	2 (3)	2	1.5	1.5	1.5	1.5	1.5	ZT / Z20 (MAX.)	Z-40°C / Z+20°C	5 (8)	4 (6)	3 (4)	2 (4)	2 (3)	2 (3)	2 (3)	2 (3)
	Rated voltage (V)	6.3	10	16	25	35	50	63	100																					
Impedance ratio	Z-25°C / Z+20°C	3 (4)	2 (3)	2	1.5	1.5	1.5	1.5	1.5																					
ZT / Z20 (MAX.)	Z-40°C / Z+20°C	5 (8)	4 (6)	3 (4)	2 (4)	2 (3)	2 (3)	2 (3)	2 (3)																					
	120Hz Values in () applicable to $\phi 10 \times 16$ or larger case size.																													
Endurance	<p>After 2000 hours' application of rated voltage at 85°C, or 1000 hours' at 105°C, capacitors meet the characteristics requirements listed at right.</p> <table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>Within $\pm 15\%$ of initial value (6.3V : Within $\pm 20\%$)</td> </tr> <tr> <td>tan δ</td> <td>150% 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 $\pm 15\%$ of initial value (6.3V : Within $\pm 20\%$)	tan δ	150% or less of initial specified value	Leakage current	Initial specified value or less																							
Capacitance change	Within $\pm 15\%$ of initial value (6.3V : Within $\pm 20\%$)																													
tan δ	150% or less of initial specified value																													
Leakage current	Initial specified value or less																													
Shelf Life	After storing the capacitors under no load at 85°C for 1000 hours, and after performing voltage treatment based on JIS C 5101-4 clause 4.1 at 20°C, they will meet the specified value for endurance characteristics listed above.																													
Marking	Printed with white color letter on black sleeve.																													

Radial Lead Type



α	(~ $\phi 10 \times 12.5$)	1.0
	($\phi 10 \times 16 \sim$)	1.5

	(mm)						
ϕD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
ϕd	0.5	0.5	0.6	0.6	0.6	0.8	0.8

- Please refer to page 21 about the end seal configuration.

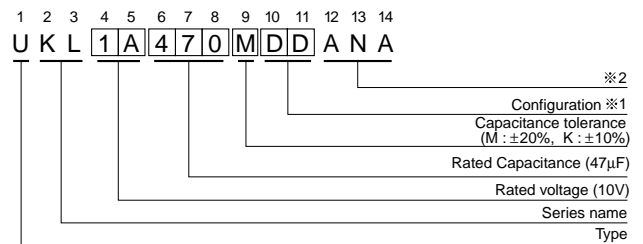
Frequency coefficient of rated ripple current

Cap. (μ F)	Frequency	50Hz	120Hz	300Hz	1kHz	10kHz ~
~ 68		0.75	1.00	1.35	1.57	2.00
	100 ~ 680	0.80	1.00	1.23	1.34	1.50
1000 ~ 10000		0.85	1.00	1.10	1.13	1.15

Please refer to page 21, 22, 23 about the formed or taped product spec.
Please refer to page 3 for the minimum order quantity.

- Dimension table in next page.

Type numbering system (Example : 10V 47 μ F)



※1 Configuration

ϕD	Pb-free leadwire Pb-free PET sleeve
5	DD
6.3	ED
8 · 10	PD
12.5 ~ 18	HD

※2 In case 105°C unit is required

■ Dimensions

V		6.3		10		16		25	
Cap.(μ F)	Code	0J		1A		1C		1E	
4.7	4R7							5 × 11	45
6.8	6R8							5 × 11	55
10	100					5 × 11	55	5 × 11	70
15	150					5 × 11	70	5 × 11	85
22	220					5 × 11	85	5 × 11	100
33	330					5 × 11	100	6.3 × 11	140
47	470			5 × 11	110	6.3 × 11	140	6.3 × 11	170
68	680			6.3 × 11	150	6.3 × 11	160	8 × 11.5	230
100	101			6.3 × 11	180	8 × 11.5	230	8 × 11.5	280
150	151			8 × 11.5	250	8 × 11.5	280	10 × 12.5	370
220	221			8 × 11.5	310	10 × 12.5	370	10 × 16	400
330	331			10 × 12.5	400	10 × 16	420	10 × 20	490
470	471	10 × 12.5	390	10 × 16	530	10 × 20	550	12.5 × 20	660
680	681	10 × 16	480	10 × 20	600	12.5 × 20	730	12.5 × 25	810
1000	102	10 × 20	650	12.5 × 20	810	12.5 × 25	910	16 × 25	1010
1500	152	12.5 × 25	910	12.5 × 25	1020	16 × 25	1150	16 × 31.5	1270
2200	222	12.5 × 25	1060	16 × 25	1200	16 × 25	1300	16 × 35.5	1440
3300	332	16 × 25	1270	16 × 31.5	1420	16 × 35.5	1550	18 × 40	1720
4700	472	16 × 31.5	1500	16 × 35.5	1650	18 × 35.5	1820		
6800	682	18 × 35.5	1760	18 × 35.5	1890				
10000	103	18 × 40	1900						

V		35		50		63		100	
Cap.(μ F)	Code	1V		1H		1J		2A	
0.1	OR1			5 × 11	1.1			5 × 11	2.1
0.15	R15			5 × 11	1.6			5 × 11	3.2
0.22	R22			5 × 11	2.3			5 × 11	4.7
0.33	R33			5 × 11	3.5			5 × 11	7.0
0.47	R47			5 × 11	5.0			5 × 11	10.1
0.68	R68			5 × 11	7.3			5 × 11	14.5
1	010			5 × 11	10.7			5 × 11	19
1.5	1R5			5 × 11	16			5 × 11	23
2.2	2R2			5 × 11	23			5 × 11	28
3.3	3R3			5 × 11	40			5 × 11	45
4.7	4R7			5 × 11	45			5 × 11	50
6.8	6R8			5 × 11	55	5 × 11	59	6.3 × 11	65
10	100			5 × 11	70	6.3 × 11	75	8 × 11.5	90
15	150	5 × 11	85	6.3 × 11	95	6.3 × 11	100	8 × 11.5	110
22	220	6.3 × 11	110	6.3 × 11	110	8 × 11.5	115	10 × 12.5	136
33	330	6.3 × 11	140	8 × 11.5	165	8 × 11.5	170	10 × 16	180
47	470	8 × 11.5	190	8 × 11.5	190	10 × 12.5	200	10 × 20	220
68	680	8 × 11.5	230	10 × 12.5	250	10 × 16	270	10 × 20	290
100	101	10 × 12.5	300	10 × 16	320	10 × 20	330	12.5 × 20	370
150	151	10 × 16	400	10 × 20	420	12.5 × 20	450	12.5 × 25	470
220	221	10 × 20	440	12.5 × 20	490	12.5 × 20	550	16 × 25	580
330	331	12.5 × 20	550	12.5 × 20	600	12.5 × 25	710	16 × 31.5	730
470	471	12.5 × 25	680	16 × 25	760	16 × 25	850	18 × 35.5	910
680	681	16 × 25	840	16 × 25	910	16 × 31.5	1050		
1000	102	16 × 25	1100	16 × 31.5	1140	18 × 35.5	1330		
1500	152	16 × 35.5	1390	18 × 40	1480			Case size ϕ D × L (mm)	Rated ripple
2200	222	18 × 35.5	1580						

Rated Ripple (mArms) at 85°C 120Hz

Rated Ripple (mA rms) of 105°C product : 70 percent value of rated ripple of 85°C product at 105°C 120Hz