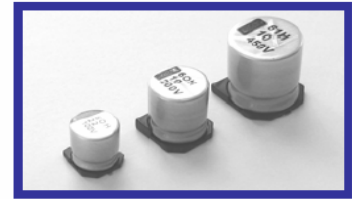


KH High Reliability 高可靠品 适用于汽车电子装备
125°C and 5000 hours Suitable for Automotive Equipment

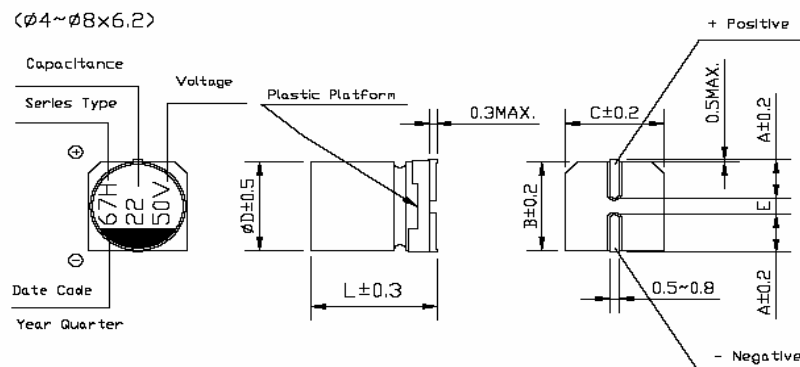
- High temperature up to +125°C
- Load life from 1000 hours to 5000 hours
- Lead-free reflow soldering is available subject to customers' request.



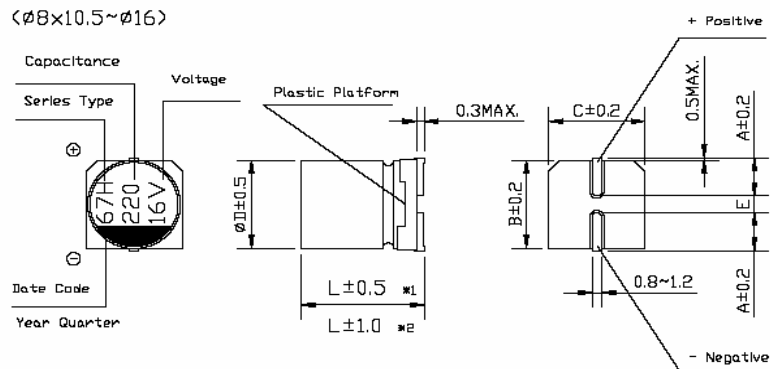
◆ **Specifications 特性**

Items 项目	Performance Characteristics 主要特性																																														
Operating Temperature Range 使用温度范围	-40~ +125°C																																														
Voltage Range 额定工作电压范围	10~450V																																														
Capacitance Range 静电容量范围	3.3~2200 μ F																																														
Capacitance Tolerance 静电容量允许偏差	± 20% at 120 Hz, 20°C																																														
Leakage Current 漏电流	For 10V~100V, after 2 minutes' application of rated voltage, leakage current is not more than 0.03CV or 4(μ A), whichever is greater. For 160V~450V, after 2 minutes' application of rated voltage, leakage current is not more than 0.04CV + 100(μ A). 10V~100V: 施加额定工作电压 2 分钟, LC≤0.03CV 或 4(μ A), 取较大值; 160V~450V: 施加额定工作电压 2 分钟, LC≤0.04CV + 100(μ A).																																														
Tan δ 损耗角正切	Measurement frequency 测试频率: 120Hz, Temperature 温度: 20°C <table border="1"> <thead> <tr> <th>Rated voltage (V.DC) 额定工作电压</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>Tan δ</td> <td>Φ 6.3~Φ 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>损耗角正切(max)</td> <td>Φ 12.5~Φ 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.DC) 额定工作电压	10	16	25	35	50	63	100	160~250	400, 450	Tan δ	Φ 6.3~Φ 10	0.24	0.20	0.16	0.14	0.14	0.18	0.18	-	损耗角正切(max)	Φ 12.5~Φ 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 低温特性	Measurement frequency 测试频率: 120Hz <table border="1"> <thead> <tr> <th>Rated voltage (V.DC) 额定工作电压</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">Impedance ratio 阻抗比</td> <td rowspan="2">Φ 6.3~Φ 10</td> <td>Z(-25°C)/Z(20°C)</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>-</td> </tr> <tr> <td>Z(-40°C)/Z(20°C)</td> <td>10</td> <td>8</td> <td>6</td> <td>4</td> <td>4</td> <td>4</td> <td>-</td> </tr> <tr> <td rowspan="2">ZT/Z20 (max)</td> <td rowspan="2">Φ 12.5~Φ 16</td> <td>Z(-25°C)/Z(20°C)</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>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>3</td> <td>3</td> <td>6</td> </tr> </tbody> </table>	Rated voltage (V.DC) 额定工作电压	10	16	25	35	50	63	100	160~250	400, 450	Impedance ratio 阻抗比	Φ 6.3~Φ 10	Z(-25°C)/Z(20°C)	4	3	2	2	2	2	-	Z(-40°C)/Z(20°C)	10	8	6	4	4	4	-	ZT/Z20 (max)	Φ 12.5~Φ 16	Z(-25°C)/Z(20°C)	4	3	2	2	2	2	3	Z(-40°C)/Z(20°C)	8	6	4	3	3	3	6
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Load Life 高温负荷特性	After 5000 hours' application of rated voltage for Φ 12.5~Φ 16 (10~100V), and 2000 hours' for Φ 8×10.5~Φ 10 (10~100V), and 1000 hours' for Φ 8×6.2~Φ 6.3, as well as 2000 hours' application of rated voltage for Φ 12.5~Φ 16 (160~450V) at 125°C, capacitors meet the characteristics requirements listed at right. 在 125°C 环境中, 施加额定工作电压 5000 小时于 Φ 12.5~Φ 16 (10~100V), 2000 小时于 Φ 8×10.5~Φ 10 (10~100V), 1000 小时于 Φ 8×6.2~Φ 6.3, 以及施加额定工作电压 2000 小时于 Φ 12.5~Φ 16 (160~450V) 后, 电容器的特性符合右表的要求。 <table border="1"> <tbody> <tr> <td>Capacitance Change 静电容量变化率</td> <td>Within ± 30% of the initial value 初始值的 ± 30% 以内</td> </tr> <tr> <td>Tan δ 损耗角正切</td> <td>300% or less of the initial specified value 不大于规范值的 300%</td> </tr> <tr> <td>Leakage Current 漏电流</td> <td>Initial specified value or less 不大于规范值</td> </tr> </tbody> </table>	Capacitance Change 静电容量变化率	Within ± 30% of the initial value 初始值的 ± 30% 以内	Tan δ 损耗角正切	300% or less of the initial specified value 不大于规范值的 300%	Leakage Current 漏电流	Initial specified value or less 不大于规范值																																								
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Shelf Life 高温储存特性	After leaving capacitors under no load at 125°C for 1000 hours, they meet the specified value for load life characteristics listed above. 在 125°C 环境中无负荷放置 1000 小时后, 电容器的特性符合高温负荷特性中所列的规定值。																																														
Resistance to Soldering Heat 耐焊接热特性	After reflow soldering and restored at room temperature, they meet the characteristics requirements listed at right. 经过回流焊并冷却至室温后, 电容器的特性符合右表的要求。 <table border="1"> <tbody> <tr> <td>Capacitance Change 静电容量变化率</td> <td>Within ± 10% of the initial value 初始值的 ± 10% 以内</td> </tr> <tr> <td>Tan δ 损耗角正切</td> <td>Initial specified value or less 不大于规范值</td> </tr> <tr> <td>Leakage Current 漏电流</td> <td>Initial specified value or less 不大于规范值</td> </tr> </tbody> </table>	Capacitance Change 静电容量变化率	Within ± 10% of the initial value 初始值的 ± 10% 以内	Tan δ 损耗角正切	Initial specified value or less 不大于规范值	Leakage Current 漏电流	Initial specified value or less 不大于规范值																																								
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Applicable Standards 适用标准	JIS C-5141 and JIS C-5102																																														

◆ **Dimensions & Marking 尺寸及印字**



KH Series



*1 [L±0.5] is applicable to $\phi 8 \times 10.5 \sim \phi 10$;

*2 [L±1.0] is applicable to $\phi 12.5 \sim \phi 16$.

Re: Date code and series type — 1st digit for Year; 2nd digit for Quarter, 4 quarter codes in one year are 1, 4, 7, 0; 3rd character for Series; KH Series = H.

(mm)

DxL	$\phi 4 \times 5.8$	$\phi 5 \times 5.8$	$\phi 6.3 \times 5.8$	$\phi 6.3 \times 7.7$	$\phi 8 \times 6.2$	$\phi 8 \times 10.5$	$\phi 10 \times 10.5$	$\phi 10 \times 13.5$	$\phi 12.5 \times 13.5$	$\phi 12.5 \times 16$	$\phi 16 \times 16.5$
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	5.8	5.8	5.8	7.7	6.2	10.5	10.5	13.5	13.5	16.0	16.5

◆ Standard size & Maximum permissible ripple current & ESR 规格壳号及最大允许纹波电流及 ESR 值

WV 电压 容量 Cap. (μF)		10				16				25			
		1A				1C				1E			
33	330									6.3×5.8	3.3	66	45
47	470					6.3×5.8	3.3	66	43	6.3×7.7 (8×6.2)	2.3	46	68
100	101	6.3×7.7 (8×6.2)	2.3	46	72	8×10.5	1.0	20	115	8×10.5	1.0	20	126
220	221	8×10.5	1.0	20	136	10×10.5	0.7	13.4	175	10×10.5	0.7	13.4	211
330	331	10×10.5	0.7	13.4	188	10×13.5	0.5	9.5	280	12.5×13.5 (10.5×13.5)	0.14 (0.5)	2.1 (9.5)	750 (270)
470	471	10×13.5	0.5	9.5	300	12.5×13.5	0.14	2.1	750	12.5×13.5	0.14	2.1	750
680	681					16×16.5 (12.5×13.5)	0.10 (0.14)	1.5 (2.1)	1000 (750)	16×16.5	0.10	1.5	1000
1000	102	12.5×16 (12.5×13.5)	0.11 (0.14)	1.5 (2.1)	900 (750)					Case Size	ESR(Ω) 20℃	ESR(Ω) -40℃	Ripple Current
2200	222	16×16.5	0.10	1.5	1000								

WV 电压 容量 Cap. (μF)		35				50			
		1V				1H			
10	100	6.3×5.8	3.3	66	38	6.3×7.7 (6.3×5.8)	2.3 (3.3)	46 (66)	50 (38)
22	220	6.3×5.8	3.3	66	39	6.3×7.7 (8×6.2)	2.3	46	50
33	330	6.3×7.7 (8×6.2)	2.3	46	62	8×10.5	1.0	20	83
47	470	8×10.5	1.0	20	92	10×10.5	0.7	13.4	111
100	101	10×10.5	0.7	13.4	151	12.5×13.5	0.23	3.5	550
220	221	12.5×13.5 (10×13.5)	0.14 (0.5)	2.1 (9.5)	750 (260)	16×16.5 (12.5×13.5)	0.15 (0.23)	2.3 (3.5)	850 (550)
330	331	12.5×13.5	0.14	2.1	750	16×16.5 (12.5×16)	0.15 (0.18)	2.3 (2.7)	850 (700)
470	471	16×16.5 (12.5×16)	0.10 (0.11)	1.5 (1.5)	1000 (900)	Case Size	ESR(Ω) 20℃	ESR(Ω) -40℃	Ripple Current

Ripple Current (mA rms) at 125℃ 100kHz

KH Series

◆ **Standard size & Maximum permissible ripple current & ESR** 规格壳号及最大允许纹波电流及 ESR 值

WV 电压		63				100			
容量 Cap. (μF)		1J				2A			
10	100	6.3×7.7 (8×6.2)	2.3	115	42	8×10.5	1.00	50	53
22	220	8×10.5	1.0	50	56	10×10.5	0.70	35	63
33	330	10×10.5	0.7	35	77	10×13.5	0.45	22.5	130
47	470	10×13.5	0.45	22.5	150	12.5×13.5	0.33	16.5	450
68	680					12.5×16	0.26	13	550
100	101	12.5×13.5	0.25	12.5	500	16×16.5	0.24	12	650
220	221	12.5×16	0.20	10	600	Case Size	ESR(Ω) 20℃	ESR(Ω) -40℃	Ripple Current
330	331	16×16.5	0.18	9	820				

Ripple Current (mA rms) at 125℃ 100kHz

◆ **Standard size & Maximum permissible ripple current** 规格壳号及最大允许纹波电流

WV 电压		160		200		250		400		450	
容量 Cap. (μF)		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				
22	220	16×16.5	180	16×16.5	180					Case Size	Ripple Current

Ripple Current (mA rms) at 125℃ 120Hz

◆ **Frequency Correction Factor of Rated Ripple Current(10~100V)** 纹波电流频率补偿系数(10~100V)

Frequency Capacitance (μF)	50Hz	120Hz	1kHz	10kHz	100kHz~
10~100	0.35	0.40	0.75	0.90	1.00
220~470	0.35	0.50	0.85	0.94	1.00
680~2200	0.40	0.60	0.85	0.95	1.00

◆ **Frequency Correction Factor of Rated Ripple Current(160~450V)** 纹波电流频率补偿系数(160~450V)

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz	100kHz~
Coefficient	0.75	1.00	1.25	1.50	1.75	1.80