

KH Series

CHIP TYPE, HIGH RELIABILITY

貼片式，高可靠品



- High temperature range up to +125°C
適用於+125°C 的高溫範圍
- Suitable for automotive equipment
適用於汽車電子裝備
- Load life of 1000~5000 hours
負荷壽命 1000~5000 小時
- RoHS & REACH compliant, Halogen-free
符合 RoHS 與 REACH，無鹵

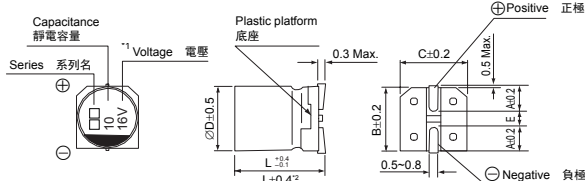


SPECIFICATIONS 特性表

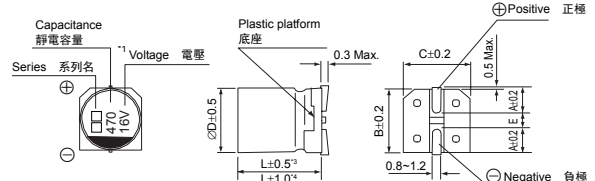
Items 項目	Characteristics 主要特性																																							
Operation Temperature Range 使用溫度範圍	-40 ~ +125°C																																							
Voltage Range 額定工作電壓範圍	10 ~ 450V																																							
Capacitance Range 靜電容量範圍	3.3 ~ 4700µF																																							
Capacitance Tolerance 靜電容量允許偏差	±20% at 120Hz, 20°C																																							
Leakage Current 漏電流	Leakage current ≤0.03CV or 4µA (10V~100V), whichever is greater (after 2 minutes application of rated voltage at 20°C) Leakage current ≤0.04CV + 100µA (160V~450V), whichever is greater (after 2 minutes application of rated voltage at 20°C) 漏電流 ≤0.03CV 或 4µA (10V~100V)，取較大值（在 20°C 環境中施加額定工作電壓 2 分鐘後） 漏電流 ≤0.04CV + 100µA (160V~450V)，取較大值（在 20°C 環境中施加額定工作電壓 2 分鐘後）																																							
Dissipation Factor (tan δ) 損耗角正切	C: Nominal capacitance (µF) 標稱靜電容量, V: Rated voltage (V) 額定電壓 Measurement frequency 測試頻率: 120Hz, Temperature 溫度: 20°C <table border="1"> <tr> <td>Rated Voltage (V) 額定工作電壓</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> <td>160~250</td> <td>400,450</td> </tr> <tr> <td>tan δ (max.) 最大損耗角正切</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></td> <td>∅12.5~∅18</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> </table>	Rated Voltage (V) 額定工作電壓	10	16	25	35	50	63	100	160~250	400,450	tan δ (max.) 最大損耗角正切	∅4~∅10	0.24	0.20	0.16	0.14	0.14	0.18	0.18	—		∅12.5~∅18	0.22	0.18	0.16	0.14	0.12	0.14	0.10	0.20									
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Stability at Low Temperature 低溫特性	Measurement frequency 測試頻率: 120Hz <table border="1"> <tr> <td colspan="2">Rated Voltage (V) 額定工作電壓</td> <td>10</td> <td>16</td> <td>25</td> <td>35~100</td> <td>160~250</td> <td>400,450</td> </tr> <tr> <td rowspan="2">Impedance Ratio 阻抗比 ZT/Z20 (max.)</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></td> <td>∅12.5~∅18</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></td> <td></td> <td>Z(-40°C) / Z(20°C)</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>6</td> </tr> </table>	Rated Voltage (V) 額定工作電壓		10	16	25	35~100	160~250	400,450	Impedance Ratio 阻抗比 ZT/Z20 (max.)	∅4~∅10	Z(-25°C) / Z(20°C)	4	3	2	2	—		Z(-40°C) / Z(20°C)	10	8	6	4	—		∅12.5~∅18	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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Load Life 高溫負荷特性	The characteristics listed below shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for the specified time at 125°C. 在 125°C 環境中連續施加規定時間的額定工作電壓後，待溫度恢復至 20°C 時進行測試，電容器的特性符合下表的要求。 <table border="1"> <tr> <td>Size (mm) 尺寸</td> <td>Life time (hours) 壽命 (小時)</td> </tr> <tr> <td>∅6.3</td> <td>1000</td> </tr> <tr> <td>∅D8, ∅10 (10~100V)</td> <td>2000</td> </tr> <tr> <td>∅D12.5~18 (160~450V)</td> <td>2000</td> </tr> <tr> <td>∅D12.5~18 (10~100V)</td> <td>5000</td> </tr> </table>	Size (mm) 尺寸	Life time (hours) 壽命 (小時)	∅6.3	1000	∅D8, ∅10 (10~100V)	2000	∅D12.5~18 (160~450V)	2000	∅D12.5~18 (10~100V)	5000																													
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Shelf Life 高溫貯存特性	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 環境中無負荷放置 1000 小時後，電容器的特性符合高溫負荷特性中所列的規定值。 <table border="1"> <tr> <td>Capacitance Change 靜電容量變化率</td> <td>Within ±30% of initial value 初始值的±30%以內</td> </tr> <tr> <td>Dissipation Factor 損耗角正切</td> <td>300% or less of initial specified value 不大於規範值的 300%</td> </tr> <tr> <td>Leakage Current 漏電流</td> <td>initial specified value or less 不大於規範值</td> </tr> </table>	Capacitance Change 靜電容量變化率	Within ±30% of initial value 初始值的±30%以內	Dissipation Factor 損耗角正切	300% or less of initial specified value 不大於規範值的 300%	Leakage Current 漏電流	initial specified value or less 不大於規範值																																	
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Resistance to Soldering Heat 耐焊接熱特性 (Please refer page 23 for soldering conditions) (焊接條件請查閱第 23 頁)	After reflow soldering and restored at room temperature, they meet the characteristics listed below. 經過回流焊並冷卻至室溫後，電容器的特性符合下表的要求。 <table border="1"> <tr> <td>Capacitance Change 靜電容量變化率</td> <td>Within ±10% of initial value 初始值的±10%以內</td> </tr> <tr> <td>Dissipation Factor 損耗角正切</td> <td>initial specified value or less 不大於規範值</td> </tr> <tr> <td>Leakage Current 漏電流</td> <td>initial specified value or less 不大於規範值</td> </tr> </table>	Capacitance Change 靜電容量變化率	Within ±10% of initial value 初始值的±10%以內	Dissipation Factor 損耗角正切	initial specified value or less 不大於規範值	Leakage Current 漏電流	initial specified value or less 不大於規範值																																	
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Leakage Current 漏電流	initial specified value or less 不大於規範值																																							
Marking 標識	Black print on the case top. 鋁殼頂部黑字印刷。																																							

DRAWING 外形圖 (Unit: mm)

(∅4~∅6.3×7.7)



(∅8×10.5~∅18)



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

6.3V 的產品標識為 [6V]
適用於∅6.3×7.7

*3. Applicable to ∅8×10.5~∅10
*4. Applicable to ∅12.5~∅18

適用於∅8×10.5~∅10
適用於∅12.5~∅18

Dimension table in next page.
尺寸表見下一頁。

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□ DIMENSIONS (Unit: mm) 尺寸表

∅D x L	4 x 5.8	5 x 5.8	6.3 x 5.8	6.3 x 7.7	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	18 x 16.5
A	2.0	2.2	2.6	2.6	3.0	3.3	3.3	4.9	4.9	5.8	6.2
B	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0	19.0
C	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0	19.0
E ± 0.2	1.0	1.4	1.9	1.9	3.1	4.7	4.7	4.7	4.7	6.4	6.4
L	5.8	5.8	5.8	7.7	10.5	10.5	13.5	13.5	16.0	16.5	18.5

□ DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT & ESR 規格尺寸及最大允許紋波電流及 ESR 值

WV	Parameter 參數	10 (1A)				16 (1C)				25 (1E)			
		Case size ∅D x L (mm) 尺寸	E.S.R. (Ω) 20°C E.S.R.值	E.S.R. (Ω) -40°C E.S.R.值	Ripple current (mA rms) at 125°C, 100KHz 紋波電流	Case size ∅D x L (mm) 尺寸	E.S.R. (Ω) 20°C E.S.R.值	E.S.R. (Ω) -40°C E.S.R.值	Ripple current (mA rms) at 125°C, 100KHz 紋波電流	Case size ∅D x L (mm) 尺寸	E.S.R. (Ω) 20°C E.S.R.值	E.S.R. (Ω) -40°C E.S.R.值	Ripple current (mA rms) at 125°C, 100KHz 紋波電流
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	2.3	46	68	
100	101	6.3 x 7.7	2.3	46	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 x 13.5)	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 (12.5 x 13.5)	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 (12.5 x 13.5)	0.11 (0.14)	1.5 (2.1)	900 (750)	16 x 16.5	0.10	1.5	1000	16 x 16.5	0.10	1.5	1000
2200	222	16 x 16.5	0.10	1.5	1000	18 x 16.5	0.09	1.5	1100				
3300	332	18 x 16.5	0.09	1.5	1100								
4700	472	18 x 16.5	0.09	1.5	1100								

WV	Parameter 參數	35 (1V)				50 (1H)			
		Case size ∅D x L (mm) 尺寸	E.S.R. (Ω) 20°C E.S.R.值	E.S.R. (Ω) -40°C E.S.R.值	Ripple current (mA rms) at 125°C, 100KHz 紋波電流	Case size ∅D x L (mm) 尺寸	E.S.R. (Ω) 20°C E.S.R.值	E.S.R. (Ω) -40°C E.S.R.值	Ripple current (mA rms) at 125°C, 100KHz 紋波電流
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	2.3	46	50
33	330	6.3 x 7.7	2.3	46	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 (260)	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)	16 x 16.5	0.15	2.3	850
1000	102	18 x 16.5	0.10	1.5	1000				

WV	Parameter 參數	63 (1J)				100 (2A)			
		Case size ∅D x L (mm) 尺寸	E.S.R. (Ω) 20°C E.S.R.值	E.S.R. (Ω) -40°C E.S.R.值	Ripple current (mA rms) at 125°C, 100KHz 紋波電流	Case size ∅D x L (mm) 尺寸	E.S.R. (Ω) 20°C E.S.R.值	E.S.R. (Ω) -40°C E.S.R.值	Ripple current (mA rms) at 125°C, 100KHz 紋波電流
10	100	6.3 x 7.7	2.3	115	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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CAT.2019/V4

KH Series

□ DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT 規格尺寸及最大允許紋波電流

WV Code μF	代碼	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 尺寸	Ripple current 紋波電流
22	220	16 × 16.5	180	16 × 16.5	180						

•Case size $\varnothing D \times L$ (mm), ripple current (mA rms) at 125°C, 120Hz •尺寸 $\varnothing D \times L$ (mm), 紋波電流(mA rms)於 125°C, 120Hz

□ FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT 紋波電流頻率補償系數

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

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

The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 5~10°C rise. When long life performance is required in actual use, the rms ripple current has to be reduced. 鋁電解電容器在疊加紋波電流後會引起發熱，溫度每上升 5~10°C 壽命會減半。若要保持長壽命性能，請在使用過程中適當降低紋波電流。

- Taping specifications are given in page 17. 編帶標準請查閱第 17 頁。
- Soldering conditions and recommended land size are given in page 23. 焊接條件及推薦安裝尺寸請查閱第 23 頁。
- Please refer to page 18 for the minimum package quantity. 最小包裝數量請查閱第 18 頁。
- Please refer to page 15 for the Part Number System. 產品編碼規則請查閱第 15 頁。

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CAT.2019/V4