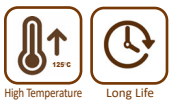
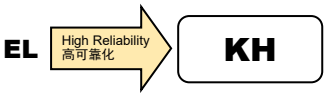
KH Series

CHIP TYPE, HIGH RELIABILITY
貼片式，高可靠品





- High temperature range up to +125°C
  適用於+125°C 的高温範圍
- Suitable for automotive equipment
  適用於汽車電子裝備
- Endurance 1000~5000 hours
  耐久性 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
Category Temperature Range 工作温度範圍	-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） C: Nominal capacitance (μF) 標稱靜電容量, V: Rated voltage (V) 額定電壓

Dissipation Factor (tan δ) 損耗角正切

Measurement frequency 測試頻率: 120Hz, Temperature 温度: 20°C

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	0.20

Stability at Low Temperature 低温特性

Measurement frequency 測試頻率: 120Hz

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	6
		Z(-40°C) / Z(+20°C)	8	6	4	3	6	10

Endurance 耐久性

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，待温度恢復至 20°C 時進行測量，電容器的特性符合下表要求。

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

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

Shelf Life 高温貯存特性

When the capacitors are restored to 20°C after leaving under no load at 125°C for 1000 hours, they meet the specified value for endurance characteristics listed above.
在 125°C 環境中無負荷放置 1000 小時後，待電容器恢復至 20°C 時進行測量，電容器的特性符合耐久性特性中所列的規定值。

Resistance to Soldering Heat 耐焊接熱特性

(Please refer page 25 for soldering conditions)
(焊接條件請查閱第 25 頁)

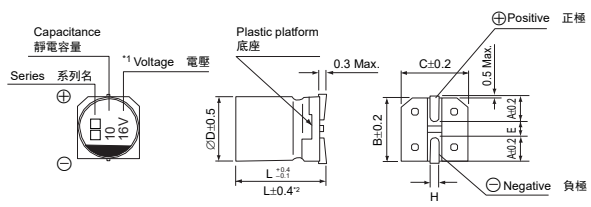
After reflow soldering and restored at room temperature, they meet the characteristics listed below.
經過回流焊並冷卻至室温後，電容器的特性符合下表要求。

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

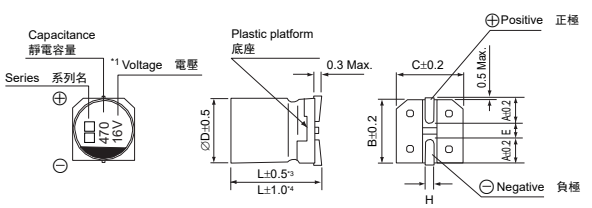
Marking 標識 — Black print on the case top. 鋁殼頂部黑字印刷。

☐ DRAWING 外形圖 (Unit: mm)

(∅4~∅6.3×7.7)



(∅8×10.5~∅18)



*1. Voltage mark for 6.3V is [6V] | 6.3V 的產品標識為 [6V]
*2. Applicable to ∅6.3×7.7 | 適用於∅6.3×7.7
*3. Applicable to ∅8×10.5~∅10 | 適用於∅8×10.5~∅10
*4. Applicable to ∅12.5~∅18 | 適用於∅12.5~∅18

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

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KH Series

☐ DIMENSIONS (Unit: mm) 尺寸表

ØD x L	4 x 5.8	5 x 5.8	6.3 x 5.8/7.7	8 x 10.5	10 x 10.5/13.5	12.5 x 13.5/16	16 x 16.5	18 x 16.5/18.5/21.5
A	2.0	2.2	2.6	3.0	3.3	4.9	5.8	6.2
B	4.3	5.3	6.6	8.4	10.4	13.0	17.0	19.0
C	4.3	5.3	6.6	8.4	10.4	13.0	17.0	19.0
E ± 0.2	1.0	1.4	1.9	3.1	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	16.5/18.5/21.5
H	0.5~0.8	0.5~0.8	0.5~0.8	0.8~1.2	0.8~1.2	0.8~1.2	1.1~1.4	1.1~1.4

☐ DIMENSIONS & STANDARD RATINGS 規格尺寸及標準參數

WV / Parameter 參數 / μF		10 (1A)				16 (1C)				25 (1E)			
		Case size ØD×L (mm) 尺寸	ESR (Ω) 20°C 等效串聯電阻	ESR (Ω) -40°C 等效串聯電阻	Ripple current (mA rms) at 125°C, 100KHz 紋波電流	Case size ØD×L (mm) 尺寸	ESR (Ω) 20°C 等效串聯電阻	ESR (Ω) -40°C 等效串聯電阻	Ripple current (mA rms) at 125°C, 100KHz 紋波電流	Case size ØD×L (mm) 尺寸	ESR (Ω) 20°C 等效串聯電阻	ESR (Ω) -40°C 等效串聯電阻	Ripple current (mA rms) at 125°C, 100KHz 紋波電流
33	330									6.3 × 5.8	3.3	66	45
47	470					6.3 × 5.8	3.3	66	43	6.3 × 7.7	2.3	46	68
100	101	6.3 × 7.7	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 (8 × 10.5)	0.7 (1.0)	13.4 (17.5)	175 (145)	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 × 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)	16 × 16.5	0.10	1.5	1000	16 × 16.5	0.10	1.5	1000
2200	222	16 × 16.5	0.10	1.5	1000	18 × 16.5 (16 × 16.5)	0.09 (0.10)	1.5 (1.5)	1100 (1000)	16 × 16.5	0.10	1.5	1000
3300	332	18 × 16.5	0.09	1.5	1100					18 × 21.5	0.068	1.5	1300
4700	472	18 × 16.5	0.09	1.5	1100	18 × 21.5	0.068	1.5	1300				

WV / Parameter 參數 / μF		35 (1V)				50 (1H)			
		Case size ØD×L (mm) 尺寸	ESR (Ω) 20°C 等效串聯電阻	ESR (Ω) -40°C 等效串聯電阻	Ripple current (mA rms) at 125°C, 100KHz 紋波電流	Case size ØD×L (mm) 尺寸	ESR (Ω) 20°C 等效串聯電阻	ESR (Ω) -40°C 等效串聯電阻	Ripple current (mA rms) at 125°C, 100KHz 紋波電流
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	2.3	46	50
33	330	6.3 × 7.7	2.3	46	62	8 × 10.5	1.0	20	83
47	470	8 × 10.5	1.0	20	92	10 × 10.5 (6.3 × 7.7)	0.7 (2.3)	13.4 (46)	111 (78)
100	101	10 × 10.5 (8 × 10.5)	0.7 (0.8)	13.4 (18)	151 (135)	12.5 × 13.5 (10 × 10.5) (10 × 13.5)	0.23 (0.7) (0.5)	3.5 (13.4) (12)	550 (151) (260)
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)	16 × 16.5	0.15	2.3	850
1000	102	18 × 16.5 (16 × 16.5)	0.10 (0.10)	1.5 (1.5)	1000 (1000)	18 × 18.5	0.15	2.3	950

WV / Parameter 參數 / μF		63 (1J)				100 (2A)			
		Case size ØD×L (mm) 尺寸	ESR (Ω) 20°C 等效串聯電阻	ESR (Ω) -40°C 等效串聯電阻	Ripple current (mA rms) at 125°C, 100KHz 紋波電流	Case size ØD×L (mm) 尺寸	ESR (Ω) 20°C 等效串聯電阻	ESR (Ω) -40°C 等效串聯電阻	Ripple current (mA rms) at 125°C, 100KHz 紋波電流
10	100	6.3 × 7.7	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 (10 × 10.5)	0.45 (0.7)	22.5 (35)	150 (125)	12.5 × 13.5	0.33	16.5	450
68	680	10 × 10.5	0.45	22.5	150	12.5 × 16	0.26	13	550
100	101	12.5 × 13.5	0.25	12.5	500	16 × 16.5 (12.5 × 13.5)	0.24 (0.25)	12 (12.5)	650 (520)
220	221	12.5 × 16 (12.5 × 13.5)	0.20 0.25	10 12.5	600 560	16 × 16.5	0.20	10	650
330	331	16 × 16.5 (12.5 × 16)	0.18 (0.18)	9 (9)	820 (720)	18 × 21.5	0.25	10	850

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CAT.2026/V2.1

KH Series

□ DIMENSIONS & STANDARD RATINGS 規格尺寸及標準參數

WV / Code 代碼 / μF		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 ∅D×L(mm), ripple current (mA rms) at 125°C, 120Hz •尺寸∅D×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	1.00
		220 ~ 470μF	0.35	0.50	0.85	0.94	1.00
		680 ~ 4700μF	0.40	0.60	0.85	0.95	1.00

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 19. 編帶標準請查閱第 19 頁。
- Soldering conditions and recommended land size are given in page 25. 焊接條件及推薦安裝尺寸請查閱第 25 頁。
- Please refer to page 20 for the minimum package quantity. 最小包裝數量請查閱第 20 頁。
- Please refer to page 18 for the Part Number System. 產品編碼規則請查閱第 18 頁。

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