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Caution for Safety:

安全注意事項:



- To use the product correctly and safely, please read "General Information for Application" very carefully.
- The products are designed and manufactured chiefly for general electronic appliances. In case that you are going to apply then for medical equipment, aircraft, space equipment, or the same kind that requires high safety, you are required to confirm application through your own testing and own judgment.
- All design and specifications in this catalogue are for reference only. If any doubt about safety for your application, please contact us immediately for technical assistance before purchase.
- 爲了正確安全地使用產品，請在使用前仔細閱讀“鋁電解電容器使用注意事項”；
- 本產品目錄中所登載的產品是爲一般電子設備用而設計和製造的，如果要用於醫療設備、宇航設備等需要高度安全性的設備，必須事先對適合性做充分的測試；
- 本產品目錄中所提供的設計及特性參數僅供參考。如果在使用上有疑問，請在採購前與我們聯繫，以便提供技術上的協助。

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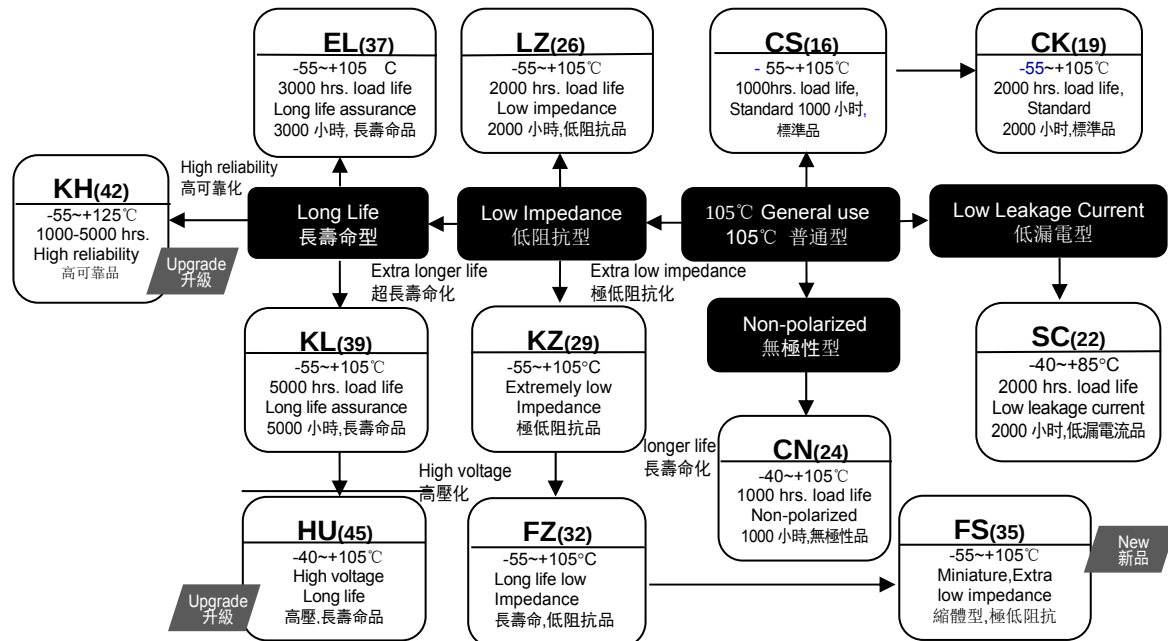
SERIES TABLE 產品系列表

■ Chip Type Aluminum Electrolytic Capacitors 貼片式鋁電解電容器

Type 類型	Series 系列	Features 特性	Standard Type 標準型	Miniature 超小型	Low Impedance 低阻抗	Long Life 長壽命	Operating Temperature Range (°C) 使用溫度範圍	Rate Voltage Range (V.D.C.) 額定工作電壓範圍	Capacitance Range (μF) 靜電容量範圍	Load Life (Hours) 負荷壽命(小時)	Page 頁碼
Surface Mount Type 貼片式	General Purpose 普通型	CS	Standard 標準品	●			-55~+105	4~450	0.1~10000	1000	16
		CK	Standard, wide temperature range 寬溫標準品	●			-55~+105	4~450	0.1~8200	1000~2000	19
	Low Leakage Current 低漏電流型	SC	Low leakage current 低漏電流品	●			-40~+85	6.3~50	0.1~220	2000	22
	Non-polarized 無極性型	CN	Non-polarized, wide temperature range 無極性寬溫品	●			-40~+105	6.3~50	0.1~100	1000	24
	Low Impedance 低阻抗型	LZ	Low impedance 低阻抗品		●		-55~+105	6.3~100	1~4700	1000~2000	26
		KZ	Extra low impedance 極低阻抗品		●		-55~+105	6.3~50	4.7~4700	2000~3000	29
		FZ	Long life, extra low impedance 長壽命, 極低阻抗品		●	●	-55~+105	6.3~100	3.3~8200	2000~5000	32
		FS	Miniature, Extra low impedance 縮體型, 極低阻抗品		●		-55~+105	6.3~50	10~2200	2000~5000	35
	Long Life 長壽命型	EL	Long life assurance 寬溫長壽命品			●	-55~+105	6.3~50	0.1~3300	2000~3000	37
		KL	5000 hours load life 5000小時長壽命品			●	-55~+105	6.3~100	0.1~3300	3000~5000	39
	High Reliability 高可靠性	KH	High reliability 高可靠性			●	-55~+125	10~450	3.3~2200	1000~5000	42
	High Voltage/ Long Life 高壓, 長壽命型	HU	High voltage, Long life 高壓, 長壽命品			●	-40~+105	160~450	1~47	3000~5000	45

SERIES CHART 產品體系圖

■ Chip Type Aluminum Electrolytic Capacitors 貼片式鋁電解電容器



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GENERAL INFORMATION FOR APPLICATION

The following precautions must be observed when using electrolytic capacitors.

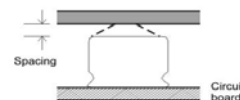
1. Circuit Design

- (1) Please make sure that the environmental and mounting conditions to which the capacitor to be exposed are within the conditions specified in this catalogue.
- (2) Operating temperature and applied ripple must be within the specifications.
 - ① The capacitors shall not be used in an ambient temperature which exceeds the operating temperature specified in the specification.
 - ② Do not apply excessive current which exceeds the allowable ripple current.
- (3) Appropriate capacitors which comply with the life requirement of the products, should be selected when designing the circuit.
- (4) Aluminum electrolytic capacitors are polarized. Make sure that no reverse voltage or AC voltage is applied to the capacitors. Please use non-polarized capacitors for a circuit that can possibly see reserved polarity.
Note: Even non-polarized capacitors cannot be used for AC voltage application.
- (5) For a circuit that repeats rapid charging/discharging of electricity, an appropriate capacitor that is capable of enduring such a condition must be used. Welding machines and photo flash are a few examples of products that contain such a circuit.
For appropriate choice of capacitors for circuit that repeat rapid charging /discharging, please consult us.
- (6) Make sure that no excess voltage (that is higher than the rated voltage) is applied to the capacitor.
 - ① Please pay attention so that the peak voltage, which is DC voltage overlapped by ripple current, should not exceed the rated voltage.
 - ② In the case where more than two aluminum electrolytic capacitors are used in series, please make sure that applied voltage should be lower than rated voltage and the voltage should be applied to each capacitor equally using a balancing resistor in parallel with the capacitor.
- (7) Outer sleeve of the capacitor is not guaranteed as an electrical insulator. Do not use standard sleeve on a capacitor in applications that require electrical insulation. When the application requires special insulation, please contact our sales office for details.
- (8) Capacitors may fail if they are used under the following conditions:
 - ① Environmental (climatic) conditions
 - (a) Being exposed to water, high temperature & high humidity atmosphere, or condensation of moisture.
 - (b) Being exposed to oil or an atmosphere that is filled with particles of oil.
 - (c) Being exposed to salty water or an atmosphere that is filled with particles of salt.
 - (d) In an atmosphere filled with toxic gases (such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, bromine, methyl bromide, ammonia, etc.)
 - (e) Being exposed to direct sunlight, ozone, ultraviolet ray, or radiation.
 - (f) Being exposed to acidic or alkaline solutions.
 - ② Severe vibration and physical shock conditions that exceed our specification.
Vibration test condition:

Vibration frequency range: 10~55~10HZ
Sweep rate : 10~55~10HZ/minute
Sweep method : logarithmic
Amplitude or acceleration: 1.5mm (maximum acceleration is 10G)
Direction of vibration : X, Y, Z direction
Testing time : 2 hours per each direction

Shock is not applicable normally.
If a particular condition is required, please contact our sales office.
- (9) When designing a circuit board, please pay attention to the following:
 - ① Have the hole spacing on the P.C. board match the lead spacing of the capacitor.
 - ② There should not be any circuit pattern or circuit wire above the capacitor safety vent.
 - ③ Unless otherwise specified, following clearance should be made above the pressure relief vent.

Case Diameter	Clearance Required
φ 6.3 to 16	2mm or more
φ 18 to 35	3mm or more
φ 40 or more	5mm or more
 - ④ In case the vent side is placed toward P.C. board (such as end seal vented parts), make a corresponding hole on the P.C. board to release the gas when vent is operated. The hole should be made to match the capacitor vent position.
- (10) The main chemical solution of the electrolyte and the separator paper in the capacitor are combustible. The electrolyte is conductive. When it comes in contact with the P.C. board, there is a possibility of pattern or short circuit between the circuit pattern, which could result in smoking or fire. Do not locate any circuit pattern beneath the capacitor end seal.
- (11) Do not design a circuit board so that heat generating components are placed near an aluminum electrolytic capacitor or reverse Side of P.C. board (under the capacitor).
- (12) Please refer to the recommended land size in this catalogue when you design in surface mount capacitors.



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- (13) Electrical characteristics may vary depending on changes in temperature and frequency. Please consider the variation when you design circuits.
- (14) When you install more than 2 capacitors in parallel, consider the balance of current following in to the capacitor.
- (15) While mounting capacitors on double side P.C. board, the capacitors should be away from those unnecessary base plate holes and connection holes.

2. Mounting

- (1) Once a capacitor has been assembled in the set and power applied, do not attempt to re-use the capacitor in other circuits or application.
- (2) Electric potential between positive and negative terminal may exist as a result of returned electromotive force, so please discharge the capacitor using 1kΩ resistor.
- (3) Leakage current of the parts that have stored for more than 2 years may increase. When leakage current has increased, please perform a voltage treatment using a 1kΩ resistor.
- (4) Please confirm ratings and polarity before installing capacitor on the P.C. board.
- (5) Do not drop the capacitors on the floor, nor use a capacitor that was dropped.
- (6) Be careful not to deform the capacitor during installation.
- (7) Please confirm that the lead spacing of the capacitor matches the pad spacing of the P.C. board prior to installation.
- (8) Please pay attention that the clinch force is not too strong when capacitors are placed and fixed by an automatic insertion machine.
- (9) Please pay attention to the mechanical shock to the capacitor by suction nozzle of the automatic insertion machine or automatic mounted, or by product checker, or by centering mechanism.
- (10) Hand soldering:
 - ① Solder condition shall be confirmed to be within the specifications.
 - ② If it is necessary that the leads must be formed due to a mismatch of the lead space to hole space on the board, bend the lead prior to soldering without applying too much stress to the capacitor.
 - ③ If you need to remove parts which were soldered, please melt the solder enough so that stress is not applied to lead.
 - ④ Please pay attention so that solder iron does not touch any portion of capacitor body.
- (11) Flow soldering (wave solder):
 - ① Aluminum capacitor body must not be submerged into the solder bath.
 - ② Soldering condition must be confirmed to be within specification.
 - ③ Please avoid having flux adhere to any portion except the terminal.
 - ④ Please avoid contact between other components and the aluminum capacitor.
- (12) Reflow soldering (SMD only):
 - ① Please follow "Reflow Soldering Condition" in this catalogue.
 - ② When an infrared heater is used, please pay attention to the extent of heating, since the absorption rate of infrared, will vary due to difference in the color and size of the capacitor.
- (13) Do not tilt lay down or twist the capacitor body after the capacitor are soldered to the P.C. board.
- (14) Do not carry the P.C. board by grasping the soldered capacitor.
- (15) Please do not allow anything to touch the capacitor after soldering. If P.C. board are stored in stack, please make sure P.C. board or the other components do not touch the capacitor. The capacitor shall not be effected by any radiated heat from the soldered P.C. board or other components after soldering.
- (16) Cleaning
 - ① Do not clean capacitors with halogenated cleaning agent. However, if it is necessary to clean with halogenated cleaning agent, please contact our sales office.
 - ② Recommended cleaning method:
Applicable: Any type, any ratings
Cleaning agents:
Based alcohol solvent cleaning agent: Isopropyl Alcohol
Based water solvent cleaning agent:
Premium alcohol solvent type: Pine Alpha ST-100S, Techno Care FRW14~17, Sanelek B-12
Surfactant type: Clean through 750H/750L/710M
Alkaline saponification agent: Aqua cleaner 210SEP
Cleaning conditions:
Total cleaning time shall be within 5 minutes by immersion, ultrasonic or other method. Temperature of the cleaning agent shall be 60℃ or lower. After cleaning, capacitors should be dried using hot air for minimum of 10 minutes along with the P.C. board. Hot air temperature should be below the maximum operating temperature of the capacitor. Insufficient dry after water rinse may cause appearance problems, sleeve shrink, bottom-plate bulge and such.
 - ③ Avoid using ozone destructive substances for cleaning agents to concern about global environment.
- (17) Fixing Material and Coating Material
 - ① Do not use any affixing or coating materials, which contain halide substance.
 - ② Remove flux and any contamination, which remains in the gap between the end seal and P.C. board.
 - ③ Please dry the cleaning agent no the P.C. board before using affixing or coating materials.
 - ④ Please do not apply any material all around the end seal when using affixing or coating materials.

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There are variations of cleaning agents, fixing and coating materials, so please contact those manufactures or our sales office to make sure that the material would not cause any problems.

(18) Other

Wooden package material may be subjected to fumigation by a halogen (e.g. methyl bromide) before they are exported in order to protect them against pests. If devices with aluminum electrolytic capacitors or capacitors themselves are fumigated or packed with the pallet that is fumigated, the capacitors may internally corrode due to the halogen contents of fumigation agents.

3. In The Equipment

- (1) Do not directly touch terminal by hand.
- (2) Do not short between terminals by conductor, nor spill conductible liquid such as alkaline or acidic solution on or near the capacitor.
- (3) Please make sure that the ambient conditions where the set is installed don't have any of the following conditions:
 - ① Where capacitors are exposed to water, high temperature & high humidity atmosphere, or condensation of moisture.
 - ② Where capacitors are exposed to oil or an atmosphere that is filled with particles of oil.
 - ③ Where capacitors are exposed to salty water, high temperature & high humidity atmosphere, or condensation of moisture.
 - ④ The atmosphere is filled with toxic acid gasses (e.g. hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, bromine, methyl bromide, etc.).
 - ⑤ The atmosphere is filled with toxic alkaline gasses (e.g. ammonia).
 - ⑥ Where capacitors are exposed to acidic or alkaline solutions.
 - ⑦ Since shrinkage, bulging and/or crack could be seen on outer sleeve of capacitor when capacitors are used in atmosphere where condensation of moisture occurs, please confirm their adaptation before the use. The condensation of moisture could occur when temperature cycling test/rapid change of temperature test is performed, in this case, aforementioned sleeve problem could be seen.

4. Maintenance and Inspection

Please periodically inspect the aluminum capacitors that are installed in industrial equipment. The following items should be checked:

- (1) Appearance: Remarkable abnormality such as vent operation, leaking electrolyte etc.
- (2) Electrical characteristic: Capacitance, dielectric loss tangent, leakage current etc., which are specified in this catalogue.

5. In an Emergency

- (1) If you see smoke due to operation of safety vent, turn off the main switch or pull out the plug from the outlet.
- (2) Do not draw your face to the safety vent since gas over 100℃ will be emitted when the safety vent operates. If the gas has entered your eyes, please flush your eyes immediately in pure water. If you breathed the gas immediately wash out your mouth and throat with water.
- (3) Do not ingest electrolyte. If your skin is exposed to electrolyte, please wash it away using soap and water.

6. Storage

- (1) Do not keep capacitor in high temperature and high humidity.
Storage conditions should be:

Temperature : +5℃ ~ +35℃
Humidity : lower than 75%
Place : Indoor
- (2) Avoid ambient conditions where capacitors can be covered with water, brine or oil.
- (3) Avoid ambient conditions where capacitors are exposed to poisonous gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonium etc.
- (4) Do not keep capacitor in conditions that expose the capacitor to ozone, ultraviolet ray or radiation.
- (5) Store capacitors in a packed condition as much as possible.

7. Disposal

- (1) Please dispose capacitors in either of the following ways:
 - ① Incinerate (at a temperature of 800℃ or higher) capacitors after crushing parts or making a hole on the capacitor body.
 - ② If incineration is not applicable, hand them over to a waste disposal agent and have them buried in a landfill.
- (2) When removing a capacitor from the circuit board or when disposing of capacitor, please ensure that the capacitor is properly discharged.

8. Others

- (1) The products meet or exceed quality standards specified by JIS-C-5141 and with the reliability requirements refer to JIS-C-5101.
- (2) None of zone depleting chemicals (ODC) under the Montreal Protocol is used in our manufacturing process.

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鋁電解電容器使用“注意事項”

使用貼片式鋁電解電容器需留意事項：

1. 電路設計

- (1) 確保電容器使用和安裝條件在本公司產品目錄的規定範圍內。
- (2) 工作溫度和施加的紋波電流應在本公司產品目錄的規定範圍內。
 - ①不可在超出最高使用溫度的溫度下使用。
 - ②不可接通超過最大允許的額定紋波電流。
- (3) 在設計電路時，應選擇符合壽命要求的產品。
- (4) 貼片式鋁電解電容器分正負極，不應加反向電壓或交流電壓。對可能出現反向電壓的電路，應選擇無極性電容器。注意：即使無極性電容器，也不能直接用於交流電路。
- (5) 對需要快速充放電的電路，請選用與使用條件相符的鋁電解電容器。作為快速充放電電路的產品有電焊機、相機閃光燈等。
對於選擇使用於快速充放電電路的鋁電解電容器，可以向我們諮詢。
- (6) 請確認不要有超載電壓（超過額定電壓的電壓）通過電容器。
 - ①直流電壓和紋波電流量加後的峰值電壓不應超過額定工作電壓。
 - ②若兩個以上電容器串聯，應確保施加電壓低於額定值，而且要並聯一個平衡電阻，以使每個電容器所加電壓相等。
- (7) 電容器膠管不能保證絕緣，不能將電容器上的膠管做絕緣用途。若有絕緣要求，請與我們銷售部門聯繫。
- (8) 如果在以下環境中使用，可能會導致電容器故障：
 - ①周圍環境（耐氣候性）條件
 - (a) 直接與水接觸、高溫高濕或結露的環境。
 - (b) 直接與油接觸或充滿油霧的環境。
 - (c) 直接與鹽水接觸或充滿鹽分的環境。
 - (d) 充滿有毒氣體（如硫化氫、亞硫酸、氯氣、溴氣、溴甲烷、氨氣等）的環境。
 - (e) 置於日照、臭氧、紫外線或放射線照射的環境。
 - (f) 直接與酸性或鹼性溶劑接觸的環境。
 - ②嚴重的振動及機械沖擊超過本公司產品目錄的規定範圍。
振動的測試條件如下：

振動頻率範圍：10~55~10HZ

振動循環頻率：10~55~10HZ/分鍾

振動周圍頻率：對數

振幅或加速度：1.5MM（最大加速度為 10G）

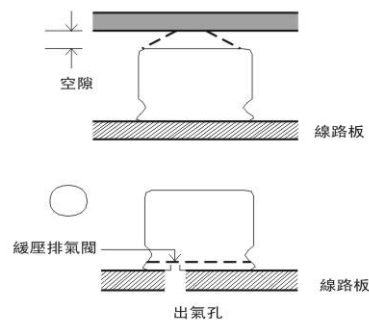
振動方向：X, Y, Z 方向

測試時間：每個方向 2 小時

沖擊一般不適用。

如有特殊要求，請與我們銷售部門聯繫。
- (9) 設計電路板時，應注意下列事項：
 - ①確保 PC 板上的焊點間距與電容器引線間距相符。
 - ②電容器的防爆閥上端盡量避免配線及安裝其他元件。
 - ③除非另有說明，電容器的防爆閥上端應留有如下的間距：

鋁殼直徑	留出空隙
φ 6.3 ~ 16	2mm 或以上
φ 18 ~ 35	3mm 或以上
φ 40 或以上	5mm 或以上
 - ④當排氣閥對著 PC 板時（如膠蓋的排氣閥），應在 PC 板上與電容器排氣閥相對應的位置上開一小孔，以釋放當排氣閥打開之後所流出的氣體。
- (10) 電解液主要化學溶劑及電解紙為易燃物，且電解液導電。當電解液與 PC 板接觸時，可能會腐蝕 PC 板上的線路，或造成短路，以至生煙或著火。因此在電容器封口下面不應有任何線路。
- (11) 設計線路板向背應確保發熱元器件不靠近鋁電解電容器或 PC 板的另一面（電容器下面）。
- (12) 當使用片式電容器進行設計時，請參考本公司產品目錄中推薦的安裝尺寸。
- (13) 設計線路板時應考慮到電性能隨溫度和頻率變化而變化。



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- (14) 當兩個以上電容器並聯時，應考慮到通過這些電容器的電流平衡。
- (15) 在雙面線路板上安裝電容器時，電容器的安裝位置應避開多餘的基板孔和過孔。

2. 安裝

- (1) 一旦電容器經過安裝及加載，不要再試圖用於其他線路板或其他用途。
- (2) 當電容器產生再生電壓時，需通過 1kΩ 左右的電阻進行放電。
- (3) 對儲存較長時間（超過 2 年）的電容器，其漏電流可能會增大。若漏電流增大，請使用 1kΩ 左右電阻做充電處理。
- (4) 將電容器安裝在 PC 板上之前，請確認其規格（靜電容量及額定電壓等）與極性。
- (5) 請不要將電容品掉在地上，或不要使用掉在地上的電容器。
- (6) 安裝時請不要損傷電容器。
- (7) 安裝前，請確認電容器引線與 PC 板上的孔距相吻合。
- (8) 請留意自動插入的機械手力量不宜過大。
- (9) 請注意貼片機的吸頭、產品檢測夾具或對中裝置對電容器的機械衝擊。
- (10) 手工焊接：
 - ① 焊接條件（溫度、時間）不可超過規格書所規定的範圍。
 - ② 如果因引線間距和線路板的孔距不一致而需要對引線加工時，在焊接前不可使用過大的力度來扭動電容器的引線。
 - ③ 如果要卸下焊接好的電容器，請將焊劑充分溶化後再拆卸，以免電容器的端子受到拉力。
 - ④ 請勿將烙鐵接觸到電容器的本體。
- (11) 波峰焊：
 - ① 不要將電容器本身浸入到焊錫溶液中。
 - ② 焊接條件（溫度、時間、次數）必須按規定說明執行。
 - ③ 注意不要將焊錫附著在端子以外。
 - ④ 焊接時，不要讓其他產品倒下碰到電容器上。
- (12) 回流焊（只適用於表面貼裝）：
 - ① 請遵守本產品目錄中的“回流焊條件”。
 - ② 當使用紅外線加熱時，請注意加熱程度，因為紅外線吸收率隨電容器顏色和大小的不同而改變。
- (13) 電容器焊接在 PC 板上後，不要傾斜或扭動電容器。
- (14) 不要抓住焊接後的電容器搬動 PC 板。
- (15) 請在焊接後不要讓任何物品與電容器接觸。如 PC 板堆放儲存，請確保 PC 板及其他零部件不與電容器接觸。
焊接後的電容器不應受任何已焊接 PC 板或其他零件熱輻射的影響。
- (16) 清洗
 - ① 不要用鹵化物清洗劑清洗電容器。
 - ② 推薦清洗方法：
 - 使用範圍：任何類型及規格
 - 清洗劑：
 - 乙醇類清洗劑：Isopropyl Alcohol（異丙醇）
 - 水性清洗劑：
 - 高級乙醇類：Pine Alpha ST-100S, Techno Care FRW14~17, Sanelek B-12
 - 介面活性劑類：Clean through 750H/750L/710M
 - 碱性皂化類：Aqua cleaner 210SEP
 - 清洗方法：浸泡、超聲波或其他方法的總清洗時間應在 5 分鐘內。清洗劑溫度應在 60℃ 或以下。清洗後，應將電容器與板一起用熱風吹至少 10 分鐘至吹乾。熱風溫度應低於電容器工作溫度。水洗後若不充分吹乾，可能導致外觀不良，如膠管收縮，座板凸起等。
 - ③ 避免使用破壞臭氧層的清洗劑以保護環境。
- (17) 固定劑、塗層劑
 - ① 請勿使用任何含有鹵素的固定劑或塗層劑。
 - ② 線路板和電容器封口膠之間，不可留有焊劑殘渣及污垢。
 - ③ 在使用固定劑或塗層劑之前，盡可能有殘留洗淨成份，進行乾燥處理，使印刷孔不堵塞。
 - ④ 在使用固定劑或塗層劑時，請勿將之塗滿整個電容器的封口膠部分。
 固定劑和塗層劑的種類很多，為避免發生問題，可向相關材料廠家或聯繫我們的銷售部門諮詢詳情。
- (18) 薰蒸處理

作為出口時的防蟲措施，有時會使用鹵化物（如甲基溴）進行薰蒸處理。將鋁電解電容器及裝配有鋁電解電容器的電子產品直接薰蒸或將進行薰蒸處理的木材用於托架時，由於薰蒸劑中含有鹵素，可能會導致電容器的內部引起腐蝕反應。

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3. 安裝後

- (1) 不要直接用手接觸電容器正負極。
- (2) 不要在正負極之間用導體短接，也不要將電容器上或附近濺撒導電液體，如酸鹼溶液等。
- (3) 請確認所安裝的電容器不要處於以下環境：
 - ① 直接與水接觸、高溫高濕或易結露的環境。
 - ② 直接與油接觸或充滿油霧的環境。
 - ③ 直接與鹽水接觸、高溫高濕或易結露的環境。
 - ④ 充滿鹽酸有機氣體（如硫化氫、亞硫酸、亞硝酸、氯氣、溴氣、溴甲烷等）的環境。
 - ⑤ 充滿有毒的鹼性氣體（如氨氣等）的環境。
 - ⑥ 直接與酸性或鹼性溶劑接觸的環境。
 - ⑦ 結露環境有可能導致膠管發生收縮、膨脹、破裂，因此在使用時請充分進行確認。此外，因溫度劇烈變化，高溫高濕試驗等而結露時，也可能會導致同樣的膠管異常。

4. 維護和檢驗

請定期檢驗安裝在工業設備上的電容器，檢驗項目如下：

- (1) 外觀：明顯缺陷，如防爆閥打開，漏液等。
- (2) 電性能：電容量，損耗角正切，漏電流等，具體請參見本產品目錄中的詳細規格資料。

5. 緊急情況

- (1) 如看到防爆閥打開冒煙，要立即關掉總開關或拔掉插頭。
- (2) 不要將臉朝向防爆閥，因當防爆閥打開時，將有超過 100℃ 的氣體噴出。若氣體進入眼中，應立即用純水沖洗眼睛；若吸入氣體，應立即用水清洗口腔和喉嚨。
- (3) 不要吞食電解液。若皮膚沾上電解液，請用肥皂和水清洗乾淨。

6. 儲存

- (1) 不要將電容器儲存在高溫和高濕度的地方。儲存環境應為：
 - 溫度：+5℃～+35℃
 - 相對濕度：<75%
 - 儲存場所：室內
- (2) 避免儲存在有水、鹽水或油的環境中。
- (3) 避免儲存在有毒氣體（如硫化氫、亞硫酸、亞硝酸、氯及氨等）的環境中。
- (4) 避免電容器接觸臭氧、紫外線或輻射。
- (5) 盡可能的把電容器保存在原來的封裝袋裏。

7. 處置

- (1) 請用下列任何一種方法處理電容器：
 - ① 在電容器的殼體上開孔或完全解體破開後置於火中焚毀（用 800℃ 或更高的溫度）。
 - ② 電容器不作焚毀時，交給工業垃圾機構進行填埋處理。
- (2) 當廢棄電容器或從線路板上卸下時，於生產過程中不使用破壞臭氧層之藥品。

8. 其他

- (1) 本公司之產品品質依據 JIS-C-5141 標準考核，其信賴性試驗方法依據 JIS-C-5101 之規範標準。
- (2) 本公司依據蒙特利爾協議書之規定，於生產過程中不使用破壞臭氧層之藥品。

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EXPLANATION OF PART NUMBER 產品編碼規則



(1, 2)		(3, 4)		(5~7)		(8)	(10)		(12)		(13, 14)	
Series 系列	Voltage (W.V.) 電壓	Code 代碼	Capacitance (μF) 靜電容量	Code 代碼	Cap. Tolerance (%) 容量允差	Code 代碼	Type 類型	Code 代碼	Diameter (∅) 直徑	Code 代碼	Length (mm) 高度	Code 代碼
CS	4	0G	0.1	0R1	+10	K	Chip 貼片		3	S	5.4	54
CK	6.3	0J	0.22	R22	-10		(11)		4	C	5.8	58
SC	10	1A	0.33	R33	+15	L	Type 類型	Lead Configuration 引線結構	5	D	6.2	62
CN	16	1C	0.47	R47	-15		Chip 貼片	Taping & Reel 編帶與卷盤	6.3	E	7.7	77
LZ	25	1E	1	010	+20	M	R		8	F	10.5	10
KZ	35	1V	2.2	2R2	-20				10	G	12.5	12
FZ	40	1G	3.3	3R3	+20	V			12.5	I	13.5	13
FS	50	1H	4.7	4R7	-10				16	K	16 (16.5)	16
EL	63	1J	6.8	6R8					18	L	21	21
KL	75	1T	10	100								
KH	80	1K	15	150								
HU	85	1R	22	220								
	100	2A	33	330								
	125	2B	47	470								
	160	2C	68	680								
	180	2Z	100	101								
	200	2D	150	151								
	220	2N	220	221								
	250	2E	330	331								
	315	2F	470	471								
	330	2U	680	681								
	350	2V	1000	102								
	360	2X	1200	122								
	400	2G	1500	152								
	420	2M	1800	182								
	450	2W	2200	222								
			2700	272								
			3300	332								
			4700	472								
			5600	562								
			6800	682								
			8200	822								

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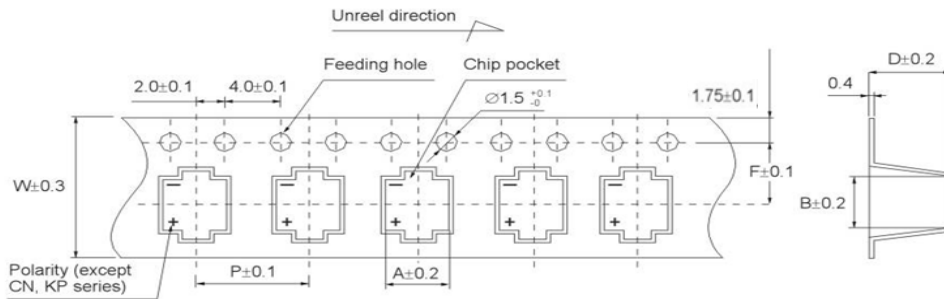
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TAPING SPECIFICATIONS 編帶標準

□ For Chip Type Aluminum Electrolytic Capacitors 貼片式鋁電解電容器

■ Carrier Tape 載帶

● Drawing 1 (for $\varnothing 4 \sim \varnothing 10$) 外形圖 1

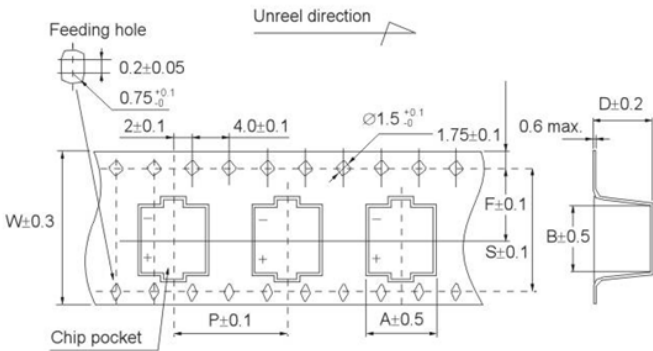


Dimension 尺寸表

(Unit: mm)

$\varnothing D \times L$	4×5.4/5.8	5×5.4/5.8	6.3×5.4/5.8	6.3×7.7/10.5	8×6.2	8×10.5/12.5	10×10.5/12.5/13.5
W	12.0	12.0	16.0	16.0	16.0	24.0	24.0
P	8.0	12.0	12.0	12.0	12.0	16.0	16.0
F	5.5	5.5	7.5	7.5	7.5	11.5	11.5
A	5.0	6.0	7.0	7.0	8.7	8.7	10.7
B	5.0	6.0	7.0	7.0	8.7	8.7	10.7
D	6.2	6.2	6.2	8.4/11.0	6.8	11.0/13.2	11.0/13.2/14.0

● Drawing 2 (for $\varnothing 12.5 \sim \varnothing 18$) 外形圖 2

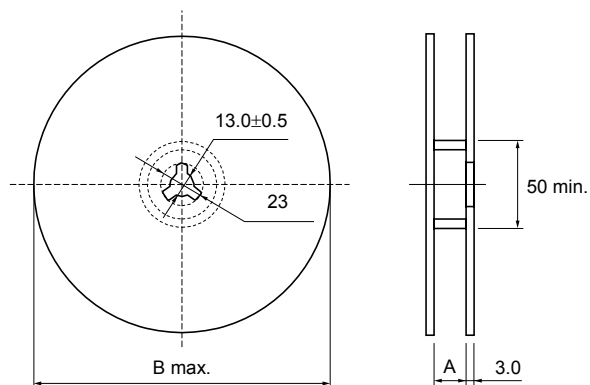


$\varnothing D \times L$	12.5×13.5	12.5×16	16×16.5	18×16.5/18.5
W	32.0	32.0	44.0	44.0
P	24.0	24.0	28.0	32.0
F	14.2	14.2	20.2	20.2
A	14.0	14.0	17.5	19.5
B	14.0	14.0	17.5	19.5
D	14.0	16.5	17.5/22.5	17.5/20.5
S	28.4	28.4	40.4	40.4

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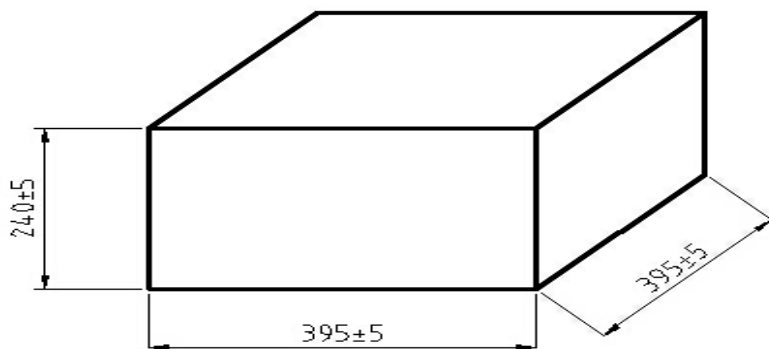
■ Reel 卷盤



∅D × L	4×5.4/5.8	5×5.4/5.8	6.3×5.4/5.8/7.7/10.5/11.5	8×10.5/12.5	8×6.2	10×10.5/12.5	10×13.5	12.5×13.5/16	16×16.5/18
A	14	14	18	26	18	26	26	34	46
B	382	382	382	382	382	382	382/332	382/332*	332*

*For a small package *為小盤包裝

■ Carton-box 外箱



■ Package Quantity 包裝數量

Size ∅D × L (mm) 尺寸	Reel(pcs) 卷盤 (個)	Carton(reels) 箱 (卷)	Carton(pcs) 箱 (個)
4 × 5.4/5.8	2,000	12	24,000
5 × 5.4/5.8	1,000	12	12,000
6.3 × 5.4/5.8	1,000	10	10,000
6.3 × 7.7	1,000	10	10,000
6.3 × 10.5	750	10	7,500
8 × 6.2	1000	10	10,000
8 × 10.5	500	7	3,500
8 × 12.5	500	7	3,500
10 × 10.5	500	7	3,500
10 × 12.5	450	7	3,150
10 × 13.5	450	7	3,150
12.5 × 13.5	250	5	2,500
12.5 × 16	200	6	1200
16 × 16.5	150	4	600
18 × 16.5, 18.5	125	4	500

*For a small package *為小盤包裝

- Please order by minimum package quantity.
- 請以最小包裝數量訂購。

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REFLOW SOLDERING CONDITIONS 回流焊條件

□ Applicable to Chip Type Aluminum Electrolytic Capacitors 適用於貼片式鋁電解電容器

■ Recommended Conditions for Reflow Soldering 推薦回流焊條件

- (1) A thermal condition system such as infrared radiation (IR) or hot blast shall be adopted, and vapor heat transfer systems(VPS) are not recommended.

應採用紅外線或熱風回流焊接，而不宜採用汽相加熱回流焊接。

- (2) Reflow soldering shall be done within 2 cycles. Please make sure that the parts have enough cooling time. 回流焊次數最多 2 次，請確保在第一次和第二次之間產品有足夠的冷卻時間。

- (3) ■ The time of preheating from 150°C to 200°C shall be within 180 seconds;

從 150°C 至 200°C 的預熱時間在 180 秒以內；

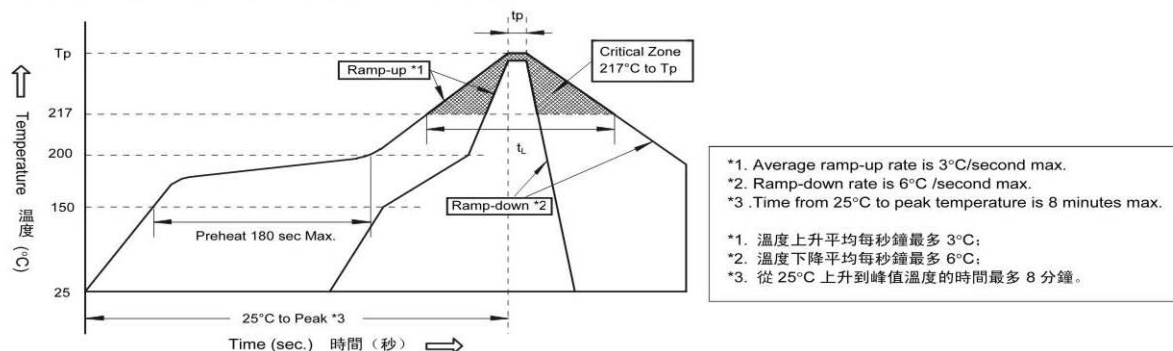
■ The time of soldering temperature at 217°C measured on capacitors' top shall not exceed t_L (second);

電容器頂部溫度超過 217°C 的焊接時間不得超過 t_L (秒)；

■ The peak temperature on capacitors' top shall not exceed T_p (°C), and the time within 5°C of actual peak temperature shall not exceed t_p (second).

電容器頂部的峰值溫度不得超過 T_p (°C)，在 5°C 範圍內的實際峰值溫度時間不得超過 t_p (秒)。

■ Classification Reflow Profile 回流焊曲線圖



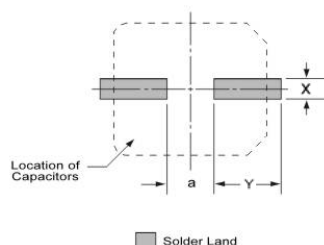
■ Classified at Temperature and Time Only for Standard Size without ()

溫度和時間分類只適用於沒有 () 的標準尺寸產品

Size 尺寸	Thickness(mm) 厚度	Volume(mm ³) 體積	T_p (°C)	t_L (second 秒)	T_p (second 秒)
$\phi 4 \sim \phi 6.3, \phi 8 \times 6.2L$	≥ 2.5	< 350	255 ± 0	60	5
$\phi 8 \times 10.5L$	≥ 2.5	$350 \sim 2000$	250 ± 0	60	5
$\phi 10 \times 10.5L/13.5L$	≥ 2.5	$350 \sim 2000$	245 ± 0	60	5
$\phi 12.5, \phi 16, \phi 18$	≥ 2.5	> 2000	240 ± 0	40	5

● Plrase contact us if your condition is over the maximum. ●如使用條件超出最大值，請與我們聯繫。

■ Recommended Solder Land Size no PC Board(Unit: mm) 推薦安裝尺寸



Size 尺寸	x	y	a
$\phi 4$	1.6	2.6	1.0
$\phi 5$	1.6	3.0	1.4
$\phi 6.3$	1.6	3.5	2.1
$\phi 8 \times 6.2L$	1.6	4.5	2.1
$\phi 8 \times 10.5L$	2.5	3.5	3.0
$\phi 10$	2.5	4.0	4.0
$\phi 12.5$	3.0	5.7	4.0
$\phi 16$	3.5	6.5	6.0
$\phi 18$	3.2	8.0	6.0

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CORRESPONDING TO RoHS DIRECTIVE RoHS 2.0 指令對應情況

Aluminum electrolytic capacitors 鋁電解電容器		Chip type 貼片式		
RoHS compliant RoHS 符合性		Yes 符合		
RoHS restricted Substances 限制有害物質	The portion of the components 產品的部分特性	Change plating from Sn-Pb to Sn 將鍍鉛錫合金更爲鍍錫		
Lead (Pb) 鉛	Plating on terminals 引線鍍層	Fe/Cu/Sn 鍍錫銅包鐵線		
	Construction of terminals 引線結構	• Plating thickness 12 μ m • Plating type matte • No heat treatment after plating • 鍍錫層厚度 12 μ m • 鍍錫層類型不光滑 • 鍍錫後無熱處理	• Plating thickness 10 μ m • Plating type matte • No heat treatment after plating • 鍍錫層厚度 10 μ m • 鍍錫層類型不光滑 • 鍍錫後無熱處理	
	Resistance to soldering heat 耐焊接熱	Please refer to “Reflow Soldering Conditions” for chip type aluminum electrolytic capacitors 請參閱貼片式鋁電解電容器的 “回 流焊條件”	No change 無變更	
	Solderability 可焊性	No difference with Sn-Pb 與鉛錫線相同		
	Tensile strength 抗拉強度	No difference with Sn-Pb 與鉛錫線相同		
	Whisker 晶須	<u>No difference with Sn-Pb Plating</u> • 60°C/90% 2000 hours • −55/+85°C 2000 cycles • Room temp.: 2000 hours <u>與鉛錫線相同</u> • 60°C/90% 2000 小時 • −55/+85°C 2000 次循環 • 室溫: 2000 小時	<u>Whisker is not observed</u> • 60°C/90% 2000 hours • −55/+85°C 2000 cycles • Room temp.: 2000 hours <u>沒有晶須</u> • 60°C/90% 2000 小時 • −55/+85°C 2000 次循環 • 室溫: 2000 小時	
Hexavalent chromium (Cr VI) 六價鉻		Not detected 未檢出		
Mercury (Hg) 汞		Not detected 未檢出		
Cadmium (Cd) 鎘		Not detected 未檢出		
Polybrominated biphenyls (PBBs) 多溴聯苯		Not detected 未檢出		
Polybronimated diphenyl ethers(PBDEs) 多溴二苯醚		Not detected 未檢出		
Diisobutyl phthalate(DIBP) 鄰苯二甲酸二异丁酯		Not detected 未檢出		
Dibutyl phthalate(DBP) 鄰苯二甲酸二丁酯		Not detected 未檢出		
Benzylbutyl phthalate(BBP) 鄰苯二甲酸丁苄酯		Not detected 未檢出		
Bis-(2-ethylhexyl)phthalate(DEHP) 鄰苯二甲酸變（2-乙基己）酯		Not detected 未檢出		
Identification for RoHS compliance products RoHS 符合性產品識別		Add “Pb free” and “RoHS” marking on inner and outer carton label 外箱和內箱上貼有 “PB free” 和 “RoHS” 標籤標識		
MSL Level 濕度敏感水平 (IPC/JEDEC J-STD-020C)		Not applicable, no need dry package 不適用，無需吸濕管理		

Contact our sales office for the following additional information:

- RoHS/Halogen test reports
- REACH test reports
- Phthalates content test reports
- Material Safety Data Sheets (MSDS)

如有需要, 請聯繫我們業務部門獲取以下附加訊息:

- RoHS/鹵素測試報告
- REACH 測試報告
- 鄰苯二甲酸監測試報告
- 物質安全資料表(MSDS)

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- For above any questions or comments regarding, please contact our sales office.
 ■ 如對以上有任何問題和意見，請與我們業務部門聯繫。

LIFE OF ALUMINUM ELECTROLYTIC CAPACITORS 鋁電解電容器的壽命

The life of aluminum electrolytic capacitors is mainly dependent on environmental conditions (e.g. ambient temperature, humidity etc.) and electrical factors (e.g. operating temperature, ripple current etc.). Generally, the wear-out mechanism of aluminum electrolytic capacitors is based on evaporation of electrolyte through the rubber seal. Consequently, the factor of temperature (ambient temperature and internal heating due to ripple current) is the most critical to electrolytic capacitors life. The effect of voltage on capacitor life is negligible, especially for low voltage electrolytic capacitors. The lifetime of aluminum electrolytic capacitors can be expressed as following equations.

鋁電解電容器的壽命主要依賴於其適用的環境條件（如溫度、濕度等）和電負荷情況（如工作電壓、紋波電流等）。通常而言，鋁電解電容器的失效機理被認為是電解液通過膠塞逐漸揮發所導致。因此，溫度因素（環境溫度和由於紋波電流所引致的內熱）對電容器壽命的影響最大，而電壓對電容器壽命的影響可以忽略，尤其對低電壓鋁電解電容器更是如此。鋁電解電容器的壽命可用下列公式來估算：

$$L_e = L_o \cdot K_t \cdot K_r$$

Where: 其中：

L_e = Expected life at operating temperature T_e (h) 在工作溫度 T_e (h) 下的預期壽命

L_o = Specified life at maximum operating temperature T_o (h) 在最大工作溫度 T_o (h) 下的壽命

K_t = Ambient temperature acceleration term 環境溫度影響因子

K_r = Ripple current acceleration term 紋波電流影響因子

$$K_t = L_o \cdot A^{(T_o - T_e)/10}$$

Where: 其中：

T_o = Maximum rated operating temperature(°C) 最大額定工作電壓溫度 (°C)

T_e = Actual ambient temperature(°C) 實際環境適用溫度 (°C)

A = Acceleration coefficient (for the range from 35°C to the maximum operating temperature, $A \approx 2$)
 加速係數（對於從 35°C 到最高工作溫度的範圍， $A \approx 2$ ）

$$K_r = 2^{(-\Delta T/5)}$$

Where: 其中：

ΔT = An increase in core temperature by internal heating due to ripple current

由於紋波電流引起的內熱造成電容器芯子的升溫

(ΔT = core temperature – ambient temperature) (ΔT = 芯子溫度 – 環境溫度)

ΔT can be estimated as follows: ΔT 可用以下公式估算：

$$\Delta T = (I^2 \cdot R) / (\beta \cdot S)$$

Where: 其中：

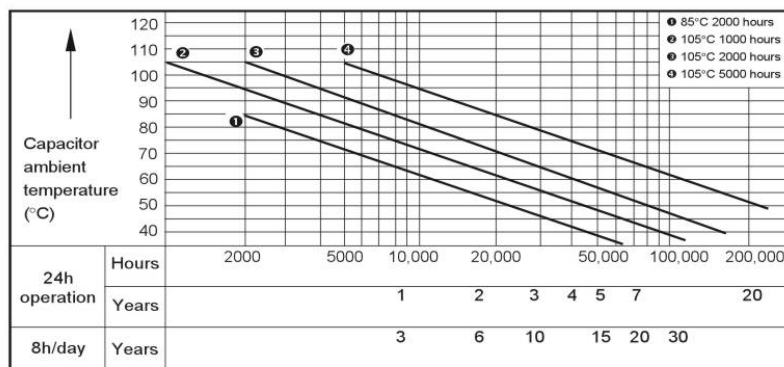
I = Ripple current of the capacitor (A rms) 通過電容器的紋波電流 (A rms)

R = Equivalent series resistance of the capacitor (Ω) 電容器的等效串聯電阻 (Ω)

β = Heat radiation coefficient of the aluminum can ($W/^\circ C \cdot cm^2$) 鋁殼的熱輻射係數 ($W/^\circ C \cdot cm^2$)

S = Surface area of the capacitor (cm^2) 電容器的表面積 (cm^2)

■ Quick Reference Guide of the Expected Life 預期壽命快速參考



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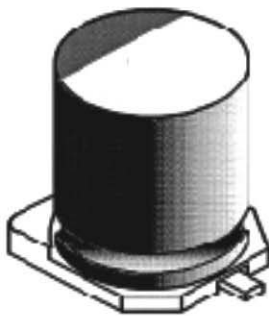
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CONSTRUCTION OF V-CHIP ALUMINUM ELECTROLYTIC CAPACITORS 貼片鋁電解電容器的結構

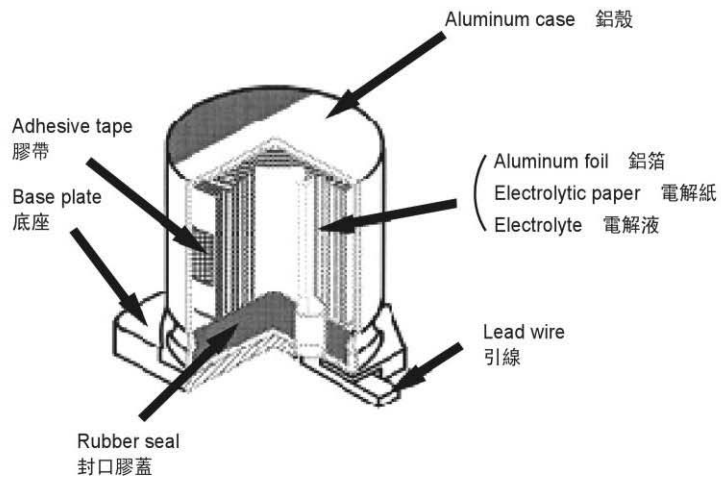
The aluminum electrolytic capacitors contains an internal element of an anode foil, a cathode foil and electrolytic paper rolled together, impregnated with an electrolyte, then attached to external terminals connecting the tabs with the anode or the cathode foils, and sealed in a can case.

鋁電解電容器是由正極與負極鋁箔鉚上正極與負極端子，再和電解紙一起卷繞成芯子，浸漬電解液後用鋁殼封裝而成。

● Appearance 外觀



● Internal Structure 內部結構



(Chip type 貼片式)

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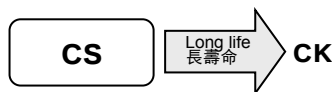
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CS Series

STANDARD

標準品

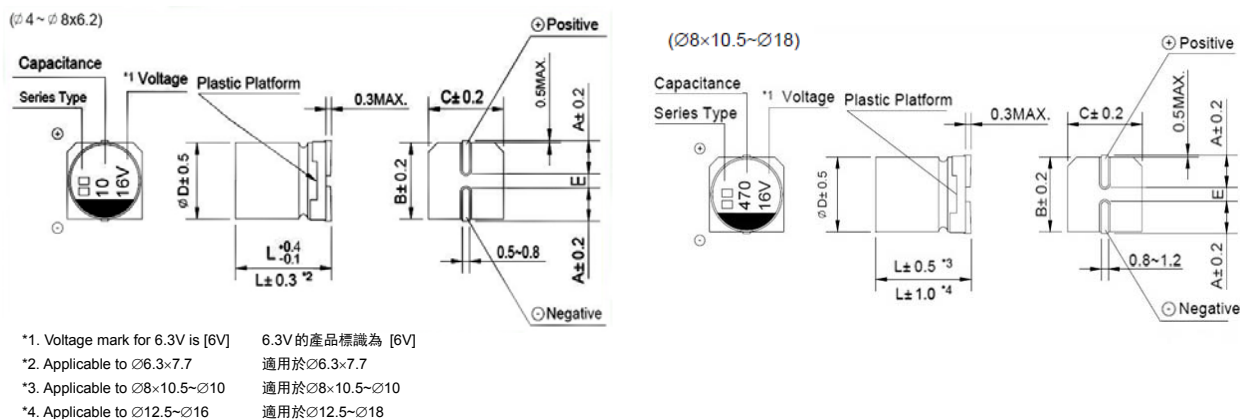
- Operating with general temperature range -55 ~ +105°C
適用於 -55 ~ +105°C 的常規溫度範圍
- Load life of 1000 hours
負荷壽命 1000 小時
- Comply with the RoHS directive
符合 RoHS 指令



SPECIFICATIONS 特性表

Items 項目	Characteristics 主要特性												
Operation Temperature Range 使用溫度範圍	-55 ~ +105°C												
Voltage Range 額定工作電壓範圍	4 ~ 450V												
Capacitance Range 靜電容量範圍	0.1 ~ 10000μF												
Capacitance Tolerance 靜電容量允許偏差	±20% at 120Hz, 20°C												
Leakage Current 漏電流	Rated Voltage 額定工作電壓	6.3~100V								160~450V			
	Case size 尺寸	Ø4~Ø10				Ø12.5~Ø18				Ø6.3~Ø18			
	Time 時間	after 2 min.(application of rated voltage) 2 分鐘後（施加額定工作電壓）				after 1 min.(application of rated voltage) 1 分鐘後（施加額定工作電壓）				after 5 min.(application of rated voltage) 5 分鐘後（施加額定工作電壓）			
	Leakage Current 漏電流	≦0.01CV or 3μA, whichever is greater ≦0.01CV 或 3μA, 取較大值				≦0.03CV or 4μA, whichever is greater ≦0.03CV 或 4μA, 取較大值				≦0.04CV or 100μA, whichever is greater ≦0.04CV 或 100μA, 取較大值			
Dissipation Factor (tan δ) 損耗角正切	Measurement frequency 測試頻率: 120Hz, Temperature 溫度: 20°C												
	Rated Voltage (V) 額定工作電壓	4	6.3	10	16	25	35	50	63	100	160~250	350~450	
	tan δ (max.) 最大損耗角正切	Ø4~Ø10	0.35	0.30	0.24	0.20	0.16	0.14	0.14	0.12	0.10	0.20	0.25
Stability at Low Temperature 低溫特性	Measurement frequency 測試頻率: 120Hz												
	Rated Voltage (V) 額定工作電壓		4	6.3	10	16	25	35	50~100	160~250	350~450		
	Impedance Ratio 阻抗比 ZT/Z20 (max.)	Ø4~Ø10	Z(-25°C) / Z(20°C)	7	4	3	2	2	2	2	2	3	
			Z(-55°C) / Z(20°C)	15	8	6	4	4	3	3	3	6	
		Ø12.5~Ø18	Z(-25°C) / Z(20°C)	7	5	4	3	2	2	2	2	4	
Z(-55°C) / Z(20°C)	17	12	10	8	5	4	3	6	10				
Load Life 高溫負荷特性	After 1000 hrs. application of the rated voltage at 105°C, they meet the characteristics listed below. 在 105°C 環境中施加額定工作電壓 1000 小時（後），電容器的特性符合下表的要求。												
	Capacitance Change 靜電容量變化率		Within ±20% of initial value (Within ±30% of initial value for 4V) 初始值的±20%以內（4V 為±30%以內）										
	Dissipation Factor 損耗角正切		200% or less of initial specified value 不大於規範值的 200%										
	Leakage Current 漏電流		initial specified value or less 不大於規範值										
Shelf Life 高溫貯存特性	After leaving capacitors under no load at 105°C for 1000 hours, they meet the specified value for load life characteristics listed above. 在 105°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。												
Resistance to Soldering Heat 耐焊接熱特性	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。												
	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 標示	Black print on the case top. 鉛殼頂部黑字印刷。												

DRAWING (Unit: mm) 外形圖



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CS Series

□ DIMENSIONS (Unit: mm) 尺寸表

∅D x L	4 x 5.4	5 x 5.4	6.3 x 5.4/7.7	8 x 6.2	8 x 10.5	10 x 10.5	10 x 12.5	12.5 x 13.5	12.5 x 16	16 x 16.5	18 x 16.5/18.5
A	2.0	2.2	2.6	3.3	3.0	3.2	3.2	4.6	4.6	5.8	6.2
B	4.3	5.3	6.6	8.3	8.3	10.3	10.3	12.8	12.8	17.0	19.0
C	4.3	5.3	6.6	8.3	8.3	10.3	10.3	12.8	12.8	17.0	19.0
E ± 0.2	1.0	1.5	2.1	2.2	3.1	4.6	4.6	4.6	4.6	6.4	6.4
L	5.4	5.4	5.4/7.7	6.2	10.5	10.5	12.5	13.5	16.0	16.5	16.5/18.5

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

μF	WV Code 代碼	4		6.3		10		16		25	
		0G		0J		1A		1C		1E	
4.7	4R7									4 x 5.4	13
10	100							4 x 5.4	18	5 x 5.4 (4 x 5.4)	20 (14)
22	220			4 x 5.4	22	5 x 5.4 (4 x 5.4)	25 (20)	5 x 5.4 (4 x 5.4)	27 (20)	6.3 x 5.4 (5 x 5.4)	36 (25)
33	330	5 x 5.4 (4 x 5.4)	30 (18)	5 x 5.4 (4 x 5.4)	27 (22)	5 x 5.4 (4 x 5.4)	30 (22)	6.3 x 5.4 (5 x 5.4)	40 (28)	6.3 x 5.4 (5 x 5.4)	44 (29)
47	470	5 x 5.4 (4 x 5.4)	36 (24)	5 x 5.4 (4 x 5.4)	33 (25)	6.3 x 5.4 (5 x 5.4) (4 x 5.4)	41 (30) (25)	6.3 x 5.4 (5 x 5.4)	48 (31)	6.3 x 5.4 (8 x 6.2)	48 (91)
56	560	4 x 5.4	32	5 x 5.4	40	6.3 x 5.4	50	6.3 x 5.4	65	6.3 x 5.4	75
68	680	5 x 5.4	40	5 x 5.4	45	6.3 x 5.4	65	6.3 x 5.4	75	6.3 x 5.4	85
100	101	6.3 x 5.4 (5 x 5.4)	60 (43)	6.3 x 5.4 (5 x 5.4)	50 (39)	6.3 x 5.4 (5 x 5.4)	53 (49)	6.3 x 5.4 (8 x 6.2)	60 (120)	6.3 x 7.7 8 x 6.2	91 130
150	151	6.3 x 5.4	52	6.3 x 5.4	55	6.3 x 5.4	62	6.3 x 7.7	95	8 x 10.5 (6.3 x 7.7)	140 (100)
220	221	6.3 x 5.4	57	6.3 x 7.7 (6.3 x 5.4)	105 (67)	6.3 x 5.4 6.3 x 7.7 (8 x 6.2)	85 105 (105)	8 x 10.5 (6.3 x 7.7) (8 x 6.2)	150 (105) (85)	6.3 x 7.7 8 x 10.5	110 175
330	331	6.3 x 7.7	100	6.3 x 7.7	105	8 x 10.5	196	8 x 10.5	195	10 x 10.5 (8 x 10.5)	240 (220)
470	471	6.3 x 7.7	105	8 x 10.5 (6.3 x 7.7)	210 (120)	10 x 10.5 (8 x 10.5) (6.3 x 7.7)	260 (210) (120)	10 x 10.5 (8 x 10.5)	295 (230)	10 x 10.5	280
680	681	8 x 10.5	210	8 x 10.5	210	10 x 10.5	270	10 x 10.5	315	10 x 12.5	400
1000	102	8 x 10.5	230	10 x 10.5 (8 x 10.5)	300 (230)	10 x 10.5 (8 x 10.5)	315 (230)	12.5 x 13.5 (10 x 12.5) (10 x 10.5)	500 (390) (340)	12.5 x 13.5	580
1500	152	10 x 10.5	315	10 x 12.5 (10 x 10.5)	450 (315)	10 x 12.5	460	12.5 x 13.5	550	12.5 x 16	850
2200	222	10 x 12.5 (10 x 10.5)	440 (340)	12.5 x 13.5 (10 x 12.5)	620 (500)	12.5 x 13.5	680	16 x 16.5 (12.5 x 16)	950 (750)	16 x 16.5	1050
3300	332	10 x 12.5	490	12.5 x 16 (12.5 x 13.5)	700 (660)	16 x 16.5	1000	16 x 16.5	1000	18 x 16.5	1450
4700	472	12.5 x 13.5	600	16 x 16.5	1000	16 x 16.5	1450	18 x 16.5	1600	18 x 18.5	1750
6800	682	16 x 16.5 (12.5 x 16)	950 (650)	18 x 16.5	1700	18 x 16.5	1700	18 x 18.5	2000	Case size 尺寸	Ripple current 紋波電流
10000	103			18 x 18.5	2000	18 x 18.5	2000				

μF	WV Code 代碼	35		50		63		100	
		1V		1H		1J		2A	
0.1	0R1			4 x 5.4	0.7	4 x 5.4	0.7		
0.22	R22			4 x 5.4	1.6	4 x 5.4	1.6		
0.33	R33			4 x 5.4	2.5	4 x 5.4	2.5		
0.47	R47			4 x 5.4	3.5	4 x 5.4	3.5		
1	010			4 x 5.4	7	4 x 5.4	7	4 x 5.4	7
2.2	2R2			4 x 5.4	11	4 x 5.4	11	6.3 x 5.4	14
3.3	3R3	4 x 5.4	13	4 x 5.4	13	5 x 5.4	13	6.3 x 7.7 (6.3 x 5.4)	32 (20)
4.7	4R7	4 x 5.4	14	5 x 5.4 (4 x 5.4)	16 (13)	6.3 x 5.4 (5 x 5.4)	21 (16)	6.3 x 7.7 (6.3 x 5.4) 5 x 5.4	35 (21) 18
10	100	5 x 5.4 (4 x 5.4)	21 (14)	6.3 x 5.4 (5 x 5.4)	34 (27)	6.3 x 7.7 (6.3 x 5.4)	55 (34)	8 x 10.5 (6.3 x 7.7) (8 x 6.2)	110 (50) (50)
22	220	5 x 5.4 6.3 x 5.4	23 54	6.3 x 5.4 (8 x 6.2)	60 (120)	8 x 10.5 (6.3 x 7.7) (8 x 6.2)	140 (70) (35)	10 x 10.5 (8 x 10.5)	180 (120)
								Case size 尺寸	Ripple current 紋波電流

•Case size ∅DxL(mm), ripple current (mA rms) at 105°C 120Hz •尺寸∅DxL(mm), 紋波電流(mA rms)於 105°C 120Hz

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

WV Code 代碼 μF		35		50		63		100		160	
		1V		1H		1J		2A		2C	
22	220									10 × 13.5	100
33	330	6.3 × 5.4 (8 × 6.2)	42 (84)	6.3 × 7.7 (8 × 6.2)	60 (65)	8 × 10.5 (6.3 × 7.7)	112 (60)	10 × 10.5	133	12.5 × 13.5	290
47	470	6.3 × 5.4 6.3 × 7.7 (8 × 6.2)	50 70 (65)	10 × 10.5 (8 × 10.5) (6.3 × 7.7)	130 (110) (63)	10 × 10.5 (8 × 10.5)	160 (119)	10 × 12.5 (10 × 10.5) 12.5 × 13.5	160 (140) 250	12.5 × 13.5 (16 × 16.5)	300 (370)
56	560	6.3 × 7.7	56	6.3 × 7.7	70	10 × 10.5	170			12.5 × 16	390
68	680	6.3 × 7.7	50	8 × 10.5	120	10 × 10.5	190			16 × 16.5	500
100	101	8 × 10.5 (6.3 × 7.7)	120 (84)	10 × 10.5 (8 × 10.5)	170 (140)	12.5 × 13.5 (10 × 12.5) (10 × 10.5)	270 (210) (196)	12.5 × 13.5	380	16 × 16.5 (18 × 16.5)	650 (690)
150	151	8 × 10.5	155	10 × 10.5	170	10 × 12.5	225				
220	221	10 × 10.5 (8 × 10.5)	220 (190)	10 × 12.5 (10 × 10.5)	280 (220)	12.5 × 13.5	470 (235)	16 × 16.5	550		
330	331	10 × 10.5	245	12.5 × 13.5 (10 × 12.5)	420 (295)	16 × 16.5 (12.5 × 16)	700 (510)	18 × 16.5	780		
470	471	12.5 × 13.5 (10 × 12.5) (10 × 10.5)	520 (375) (280)	16 × 16.5 (12.5 × 13.5)	700 (420)	16 × 16.5	750				
680	681	12.5 × 13.5 (10 × 12.5)	530 (395)	16 × 16.5	750	18 × 16.5	1100				
1000	102	16 × 16.5 (12.5 × 16)	750 (600)	18 × 16.5	1350						
2200	222	18 × 16.5	1450							Case size 尺寸	Ripple current 紋波電流
3300	333	18 × 18.5	1750								

WV Code 代碼 μF		200		250		350		400		450	
		2D		2E		2V		2G		2W	
3.3	3R3							10 × 13.5	80	10 × 13.5	80
4.7	4R7					10 × 13.5	115	10 × 13.5 (12.5 × 13.5)	100 (120)	10 × 13.5 (12.5 × 13.5)	100 (120)
10	100	10 × 13.5	135	10 × 13.5	135	12.5 × 13.5	120	12.5 × 13.5	120	12.5 × 13.5 (12.5 × 16)	100 (130)
22	220	12.5 × 13.5	240	12.5 × 13.5	150	16 × 16.5	140	16 × 16.5	140	16 × 16.5	140
33	330	12.5 × 13.5	300	12.5 × 16 (16 × 16.5)	240 (300)	16 × 16.5	140	16 × 16.5	140	18 × 16.5	180
47	470	16 × 16.5	420	16 × 16.5	340	18 × 16.5	280	18 × 16.5	280	Case size 尺寸	Ripple current 紋波電流
100	101	16 × 16.5	420	18 × 16.5	440	18 × 16.5	350	18 × 16.5	350		

• Case size ØD×L(mm), ripple current (mA rms) at 85°C 120Hz • 尺寸ØD×L(mm), 紋波電流(mA rms)於 85°C 120Hz

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

Frequency 頻率			50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系數	Ø4 ~ Ø10	0.1 ~ 68μF	0.70	1.00	1.17	1.36	1.50
		100 ~ 3300μF	0.85	1.00	1.08	1.20	1.30
	Ø12.5 ~ Ø16	~ 68μF	0.75	1.00	1.35	1.57	2.00
		100 ~ 680μF	0.80	1.00	1.23	1.34	1.50
		1000 ~ 6800μF	0.85	1.00	1.10	1.13	1.15

- Taping specifications are given in page 10. 編帶標準請參閱第 10 頁。
- Please refer to page 11 for the minimum package quantity. 最小包裝數量請參閱第 11 頁。

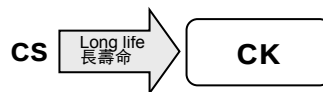
NOTE: All designs and specifications are for reference only and are subject to change without prior notice. If any doubt about safety for your application, please contact us immediately for technical assistance before purchase.

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WIDE TEMPERATURE

寬溫品

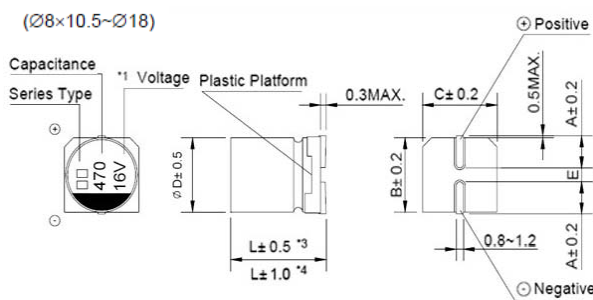
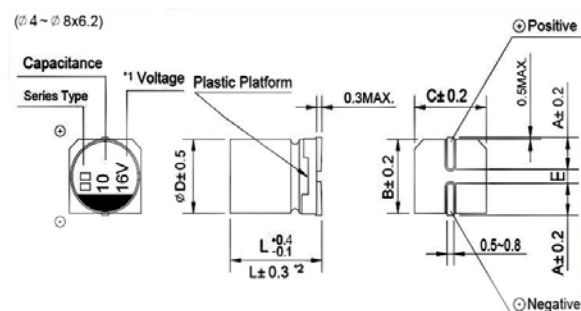
- Operating with wide temperature range -55 ~ +105°C
適用於 -55 ~ +105°C 的寬溫範圍
- Load life of 2000 hours
負荷壽命 2000 小時
- Comply with the RoHS directive
符合 RoHS 指令



□ SPECIFICATIONS 特性表

Items 項目	Characteristics 主要特性												
Operation Temperature Range 使用溫度範圍	-55 ~ +105°C												
Voltage Range 額定工作電壓範圍	4 ~ 450V												
Capacitance Range 靜電容量範圍	0.1 ~8200μF												
Capacitance Tolerance 靜電容量允許偏差	±20% at 120Hz, 20°C												
Leakage Current 漏電流	Rated Voltage 額定工作電壓	6.3~100V								160~450V			
	Case size 尺寸	Ø4~Ø10				Ø12.5~Ø18				Ø6.3~Ø18			
	Time 時間	after 2 min.(application of rated voltage) 2 分鐘後（施加額定工作電壓）				after 1 min.(application of rated voltage) 1 分鐘後（施加額定工作電壓）				after 5 min.(application of rated voltage) 5 分鐘後（施加額定工作電壓）			
	Leakage Current 漏電流	≦0.01CV or 3μA, whichever is greater ≦0.01CV 或 3μA，取較大值				≦0.03CV or 4μA, whichever is greater ≦0.03CV 或 4μA，取較大值				≦0.04CV or 100μA, whichever is greater ≦0.04CV 或 100μA，取較大值			
Dissipation Factor (tan δ) 損耗角正切	Measurement frequency 測試頻率: 120Hz, Temperature 溫度: 20°C												
	Rated Voltage (V) 額定工作電壓	4	6.3	10	16	25	35	50	63	100	160~250	350~450	
	tan δ (max.) 最大損耗角正切	Ø4~Ø10 Ø12.5~Ø18	0.35 0.42	0.30 0.38	0.24 0.34	0.20 0.30	0.16 0.26	0.14 0.22	0.14 0.18	0.12 0.14	0.12 0.12	0.20 0.20	0.25 0.25
Stability at Low Temperature 低溫特性	Measurement frequency 測試頻率: 120Hz												
	Rated Voltage (V) 額定工作電壓		4	6.3	10	16	25	35	50~63	100	160~250	350~450	
	Impedance Ratio 阻抗比 ZT/Z20 (max.)	Ø4~Ø10 Ø12.5~Ø18	Z(-25°C) / Z(20°C)	7	4	3	2	2	2	3	2	3	
			Z(-55°C) / Z(20°C)	15	8	6	4	4	3	4	3	6	
Z(-25°C) / Z(20°C)			7	5	4	3	2	2	2	2	4		
Load Life 高溫負荷特性	After 2000 hrs. (1000 hrs. for Ø4~Ø6.3×5.4) application of the rated voltage at 105°C, they meet the characteristics listed below. 在 105°C 環境中施加額定工作電壓 2000 小時（Ø4~Ø6.3×5.4 為 1000 小時）後，電容器的特性符合下表的要求。												
	Capacitance Change 靜電容量變化率		Within ±20% of initial value for capacitors of 10V or more (Within ±30% of initial value for capacitors of 4V or less) ≥10V 為初始值的±20%以內（≤4V 為初始值的±30%以內）										
	Dissipation Factor 損耗角正切		200% or less of initial specified value 不大於規範值的 200%										
	Leakage Current 漏電流		initial specified value or less 不大於規範值										
Shelf Life 高溫貯存特性	After leaving capacitors under no load at 105°C for 1000 hours, they meet the specified value for load life characteristics listed above. 在 105°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。												
Resistance to Soldering Heat 耐焊接熱特性	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。												
	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 標示	Black print on the case top. 鋁殼頂部黑字印刷。												

□ DRAWING (Unit: mm) 外形圖



- *1. Voltage mark for 6.3V is [6V] 6.3V 的產品標識為 [6V]
 *2. Applicable to Ø6.3x7.7 適用於 Ø6.3x7.7
 *3. Applicable to Ø8x10.5~Ø10 適用於 Ø8x10.5~Ø10
 *4. Applicable to Ø12.5~Ø18 適用於 Ø12.5~Ø18

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□ DIMENSIONS (Unit: mm) 尺寸表

ØD x L	4 x 5.4	5 x 5.4	6.3 x 5.4/7.7	8 x 6.2	8 x 10.5	10 x 10.5	10 x 12.5	12.5 x 13.5	12.5 x 16	16 x 16.5	18 x 16.5/18.5
A	2.0	2.2	2.6	3.3	3.0	3.2	3.2	4.7	4.7	5.8	6.2
B	4.3	5.3	6.6	8.3	8.3	10.3	10.3	12.8	12.8	17.0	19.0
C	4.3	5.3	6.6	8.3	8.3	10.3	10.3	12.8	12.8	17.0	19.0
E ± 0.2	1.0	1.5	2.1	2.2	3.1	4.6	4.6	4.6	4.6	6.4	6.4
L	5.4	5.4	5.4/7.7	6.2	10.5	10.5	13.5	13.5	16.0	16.5	16.5/18.5

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

WV Code 代碼	µF	4		6.3		10		16		25	
		0G		0J		1A		1C		1E	
4.7	4R7									4 x 5.4	13
10	100			4 x 5.4	18			4 x 5.4	18	5 x 5.4 (4 x 5.4)	20 (14)
22	220			4 x 5.4	22	5 x 5.4 (4 x 5.4)	25 (20)	5 x 5.4 (4 x 5.4)	27 (20)	6.3 x 5.4 (5 x 5.4)	36 (25)
33	330	5 x 5.4 (4 x 5.4)	30 (18)	5 x 5.4 (4 x 5.4)	27 (22)	5 x 5.4 (4 x 5.4)	30 (22)	6.3 x 5.4 (5 x 5.4)	40 (28)	6.3 x 5.4 (5 x 5.4)	44 (29)
47	470	5 x 5.4 (4 x 5.4)	36 (24)	5 x 5.4 (4 x 5.4)	33 (25)	6.3 x 5.4 (5 x 5.4) (4 x 5.4)	41 (30) (25)	6.3 x 5.4 (5 x 5.4)	48 (31)	5 x 5.4 6.3 x 5.4	35 48
100	101	6.3 x 5.4 (5 x 5.4)	60 (43)	6.3 x 5.4 (5 x 5.4)	50 (39)	5 x 5.4 6.3 x 5.4	39 (53)	6.3 x 5.4 (8 x 6.2)	60 (120)	6.3 x 7.7 (8 x 6.2)	91
150	151	6.3 x 5.4	52	6.3 x 5.4	55	6.3 x 5.4	62	6.3 x 7.7	95	8 x 10.5 (6.3 x 7.7)	140 (100)
220	221	6.3 x 5.4	57	6.3 x 7.7 (6.3 x 5.4)	105 (67)	6.3 x 5.4 6.3 x 7.7 (8 x 6.2)	67 105 (105)	8 x 10.5 (6.3 x 7.7) (8 x 6.2)	150 (105) (85)	6.3 x 7.7 8 x 10.5	120 175
330	331	6.3 x 7.7	100	6.3 x 7.7	105	6.3 x 7.7 8 x 10.5	105 196	8 x 10.5	195	10 x 10.5 (8 x 10.5)	240 (220)
470	471	6.3 x 7.7	105	8 x 10.5 (6.3 x 7.7)	210 (120)	6.3 x 7.7 10 x 10.5 (8 x 10.5)	120 260 (210)	10 x 10.5 (8 x 10.5)	295 (230)	8 x 10.5 10 x 10.5	240 280
680	681	8 x 10.5	210	8 x 10.5	210	10 x 10.5	270	10 x 10.5	315	10 x 10.5 10 x 12.5	350 400
1000	102	8 x 10.5	230	10 x 10.5 (8 x 10.5)	300 (230)	10 x 10.5 (8 x 10.5)	315 (230)	12.5 x 13.5 (10 x 12.5) (10 x 10.5)	500 (390) (340)	12.5 x 13.5	580
1500	152	10 x 10.5	315	10 x 12.5 (10 x 10.5)	450 (315)	10 x 12.5	460	12.5 x 13.5	550	12.5 x 16	850
2200	222	10 x 12.5 (10 x 10.5)	440 (340)	12.5 x 13.5 (10 x 12.5)	620 (500)	12.5 x 13.5	680	16 x 16.5 (12.5 x 16)	950 (750)	16 x 16.5	1050
3300	332	10 x 12.5	490	12.5 x 16 (12.5 x 13.5)	700 (660)	16 x 16.5	1000	16 x 16.5	1000	18 x 16.5	1150
4700	472	12.5 x 13.5	600	16 x 16.5	1000	16 x 16.5	1000	18 x 16.5	1226	18 x 18.5	1300
6800	682	16 x 16.5 (12.5 x 16)	950 (650)	18 x 16.5	1290	18 x 16.5	1290			Case size 尺寸	Ripple current 紋波電流
8200	822			18 x 18.5	1450	18 x 18.5	1450				

WV Code 代碼	µF	35		50		63		100	
		1V		1H		1J		2A	
0.1	0R1			4 x 5.4	0.7	4 x 5.4	0.7		
0.22	R22			4 x 5.4	1.6	4 x 5.4	1.6		
0.33	R33			4 x 5.4	2.5	4 x 5.4	2.5		
0.47	R47			4 x 5.4	3.5	4 x 5.4	3.5		
1	010			4 x 5.4	7	4 x 5.4	7	4 x 5.4	7
2.2	2R2			4 x 5.4	11	4 x 5.4	11	6.3 x 5.4	14
3.3	3R3	4 x 5.4	13	4 x 5.4	13	5 x 5.4	13	6.3 x 7.7 (6.3 x 5.4) (8 x 6.2)	32 (20) (30)
4.7	4R7	4 x 5.4	14	5 x 5.4 (4 x 5.4)	16 (13)	5 x 5.4	16	5 x 5.4 6.3 x 7.7 (6.3 x 5.4)	18 35 (21)
10	100	5 x 4.5 5 x 5.4 (4 x 5.4)	18 21 (14)	5 x 5.4 6.3 x 5.4	21 24	6.3 x 7.7 (6.3 x 5.4) (8 x 6.2)	39 (24) (25)	8 x 10.5 8 x 6.2 (6.3 x 7.7)	77 35 (35)
22	220	5 x 5.4 6.3 x 5.4	30 38	6.3 x 7.7 (6.3 x 5.4) (8 x 6.2)	51 (42) (70)	8 x 10.5 (6.3 x 7.7)	98 (49)	10 x 10.5 (8 x 10.5)	126 (84)
33	330	6.3 x 5.4 (8 x 6.2)	42 (84)	6.3 x 7.7 8 x 6.2	60 84	8 x 10.5	112	10 x 10.5	133
								Case size 尺寸	Ripple current 紋波電流

• Case size ØD x L (mm), ripple current (mA rms) at 105°C 120Hz • 尺寸 ØD x L (mm), 紋波電流 (mA rms) 於 105°C 120Hz

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

μF	WV Code 代碼	35		50		63		100	
		1V		1H		1J		2A	
47	470	6.3 × 7.7 (6.3 × 5.4)	70 (50)	8 × 6.2 8 × 10.5 (6.3 × 7.7)	95 120 (63)	10 × 10.5 (8 × 10.5)	160 (119)	12.5 × 13.5 (10 × 12.5) (10 × 10.5)	250 (160) (140)
68	680	6.3 × 5.4 6.3 × 7.7	75 75			10 × 10.5	175	12.5 × 13.5 (10 × 12.5)	300 (180)
100	101	8 × 6.2 8 × 10.5 6.3 × 5.4 (6.3 × 7.7)	110 120 75 (84)	10 × 10.5 (8 × 10.5) 6.3 × 7.7	170 (140) 105	12.5 × 13.5 (10 × 12.5) (10 × 10.5)	270 (210) (196)	16 × 16.5 (12.5 × 13.5)	450 (380)
150	151	8 × 10.5	155	10 × 10.5	170	10 × 12.5	225		
220	221	10 × 10.5 (8 × 10.5)	220 (190)	10 × 12.5 (10 × 10.5)	280 (220)	16 × 16.5 (12.5 × 13.5)	560 (470) (235)	16 × 16.5	550
330	331	10 × 10.5	245	16 × 16.5 (12.5 × 13.5) (10 × 12.5) 10 × 10.5	600 (420) (295) 285	16 × 16.5 (12.5 × 16) 12.5 × 13.5	700 (510) 460	18 × 16.5	590
470	471	12.5 × 13.5 (10 × 12.5) (10 × 10.5)	520 (375) (305)	16 × 16.5 (12.5 × 16)	700 (520)	16 × 16.5	750	18 × 18.5	980
680	681	12.5 × 13.5 (10 × 12.5) (10 × 10.5)	530 (395) (395)	16 × 16.5	750	18 × 16.5	790	Case size 尺寸	Ripple current 紋波電流
1000	102	16 × 16.5 (12.5 × 16)	750 (600)	18 × 16.5	990				
1500	152	16 × 16.5	750						
2200	222	18 × 16.5	1050						

μF	WV Code 代碼	160		200		250		350	
		2C		2D		2E		2V	
4.7	4R7					10 × 13.5	65	10 × 13.5	45
10	100			10 × 13.5	75	10 × 13.5	70	12.5 × 13.5	50
22	220	10 × 13.5	50	12.5 × 13.5	105	12.5 × 13.5	105	16 × 16.5	85
33	330	12.5 × 13.5	95	12.5 × 13.5	120	16 × 16.5	180	18 × 16.5	100
47	470	12.5 × 13.5 (16 × 16.5)	205 (240)	16 × 16.5	220	16 × 16.5	220	Case size 尺寸	Ripple current 紋波電流
100	101	16 × 16.5	250	18 × 16.5	280	18 × 16.5	260		

μF	WV Code 代碼	400		450					
		2G		2W					
3.3	3R3	10 × 13.5 (8 × 10.5)	40 (35)	10 × 13.5 (8 × 12.5)	40 (38)				
4.7	4R7	10 × 13.5 (12.5 × 13.5)	45 (48)	10 × 13.5 (12.5 × 13.5)	42 45				
10	100	12.5 × 13.5	50	12.5 × 13.5	70				
22	220	16 × 16.5	85	16 × 16.5	85			Case size 尺寸	Ripple current 紋波電流
33	330	18 × 16.5	100	18 × 16.5	100				

• Case size ØD×L(mm), ripple current (mA rms) at 105°C 120Hz • 尺寸ØD×L(mm), 紋波電流(mA rms)於 105°C 120Hz

□ FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT 紋波電流頻率補償係數

Frequency 頻率			50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 係數	Ø4 ~ Ø10	0.1 ~ 68μF	0.70	1.00	1.17	1.36	1.50
		100 ~ 3300μF	0.85	1.00	1.08	1.20	1.30
	Ø12.5 ~ Ø16	~ 68μF	0.75	1.00	1.35	1.57	2.00
		100 ~ 680μF	0.80	1.00	1.23	1.34	1.50
		1000 ~ 8200μF	0.85	1.00	1.10	1.13	1.15

● Taping specifications are given in page 10. 編帶標準請參閱第 10 頁。

● Please refer to page 11 for the minimum package quantity. 最小包裝數量請參閱第 11 頁

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LOW LEAKAGE CURRENT

低漏電品

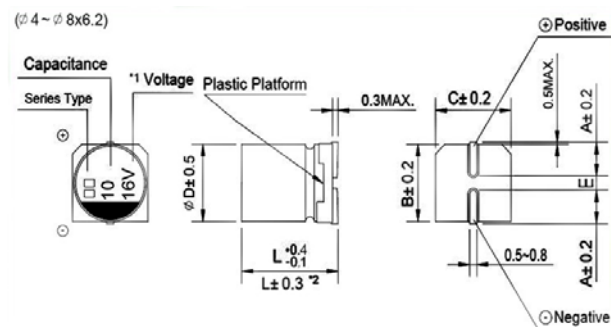
- Low leakage current (0.5 ~ 3.3μA max.)
低漏電流 (0.5 ~ 3.3μA 最大值)
- Low cost for replacement of some tantalum applications
可替換價格較高的鉭電容器
- Comply with the RoHS directive
符合 RoHS 指令



SPECIFICATIONS 特性表

Items 項目	Characteristics 主要特性						
Operation Temperature Range 使用溫度範圍	-40 ~ +85°C						
Voltage Range 額定工作電壓範圍	6.3 ~ 50V						
Capacitance Range 靜電容量範圍	0.1 ~ 220μF						
Capacitance Tolerance 靜電容量允許偏差	±20% at 120Hz, 20°C						
Leakage Current 漏電流	Leakage current ≦ 0.002CV or 0.5μA, whichever is greater (after 2 minutes application of rated voltage) 漏電流 ≦ 0.002CV 或 0.5μA，取較大值（施加額定工作電壓 2 分鐘後）						
Surge Voltage & Dissipation Factor (tan δ) 浪湧電壓和損耗角正切	Measurement frequency 測試頻率: 120Hz, Temperature 溫度: 20°C						
	Rated Voltage (V) 額定工作電壓	6.3	10	16	25	35	50
	Surge voltage 浪湧電壓	8.0	13	20	32	44	63
	tan δ (max.) 最大損耗角正切	0.24	0.20	0.16	0.14	0.12	0.10
Stability at Low Temperature 低溫特性	Measurement frequency 測試頻率: 120Hz						
	Rated Voltage (V) 額定工作電壓		6.3	10	16, 25	35, 50	
	Impedance Ratio 阻抗比	Z(-25°C) / Z(20°C)	4	3	2	2	
	ZT/Z20 (max.)	Z(-40°C) / Z(20°C)	8	6	4	3	
Load Life 高溫負荷特性	After 2000 hours application of the rated voltage at 85°C, they meet the characteristics listed below. 在 85°C 環境中施加額定工作電壓 2000 小時後，電容器的特性符合下表的要求。						
	Capacitance Change 靜電容量變化率		Within ±25% of initial value 初始值的±25%以內				
	Dissipation Factor 損耗角正切		200% or less of initial specified value 不大於規範值的 200%				
	Leakage Current 漏電流		initial specified value or less 不大於規範值				
Resistance to Soldering Heat 耐焊接熱特性	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。						
	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 標示	Black print on the case top. 鋁殼頂部黑字印刷。						

DRAWING (Unit: mm) 外形圖



- *1. Voltage mark for 6.3V is [6V] 6.3V 的產品標識為 [6V]
 *2. Applicable to Ø6.3x7.7 適用於 Ø6.3x7.7

DIMENSIONS (Unit: mm) 尺寸表

ØD x L	4 x 5.4	5 x 5.4	6.3 x 5.4	6.3 x 7.7
A	2.0	2.2	2.6	2.6
B	4.3	5.3	6.6	6.6
C	4.3	5.3	6.6	6.6
E ± 0.2	1.0	1.5	2.1	2.1
L	5.4	5.4	5.4	7.7

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□ 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 μF		6.3 (0J)			10 (1A)			16 (1C)		
		Case size ØD×L (mm) 尺寸	E.S.R. (Ω) 20°C 120Hz E.S.R.值	Ripple current (mA rms) at 85°C 120Hz 紋波電流	Case size ØD×L (mm) 尺寸	E.S.R. (Ω) 20°C 120Hz E.S.R.值	Ripple current (mA rms) at 85°C 120Hz 紋波電流	Case size ØD×L (mm) 尺寸	E.S.R. (Ω) 20°C 120Hz E.S.R.值	Ripple current (mA rms) at 85°C 120Hz 紋波電流
10	100							4 × 5.4	34.5	25
22	220	4 × 5.4	23.5	31	5 × 5.4	19.6	35	5 × 5.4	15.7	39
33	330	5 × 5.4	15.7	39	5 × 5.4	13.1	43	6.3 × 5.4	10.5	57
47	470	5 × 5.4	11.0	47	6.3 × 5.4	9.2	59	6.3 × 5.4	7.3	68
100	101	6.3 × 5.4	5.2	75	6.3 × 5.4	4.3	76	6.3 × 7.7	3.5	96
220	221	6.3 × 7.7	2.4	85						

WV Parameter 參數 μF		25 (1E)			35 (1V)			50 (1H)		
		Case size ØD×L (mm) 尺寸	E.S.R. (Ω) 20°C 120Hz E.S.R.值	Ripple current (mA rms) at 85°C 120Hz 紋波電流	Case size ØD×L (mm) 尺寸	E.S.R. (Ω) 20°C 120Hz E.S.R.值	Ripple current (mA rms) at 85°C 120Hz 紋波電流	Case size ØD×L (mm) 尺寸	E.S.R. (Ω) 20°C 120Hz E.S.R.值	Ripple current (mA rms) at 85°C 120Hz 紋波電流
0.1	0R1							4 × 5.4	2156	1.0
0.22	R22							4 × 5.4	980	2.3
0.33	R33							4 × 5.4	653	3.5
0.47	R47							4 × 5.4	459	5
1	010							4 × 5.4	216	10
2.2	2R2							4 × 5.4	98	15
3.3	3R3							4 × 5.4	65	18
4.7	4R7	4 × 5.4	64.2	19	4 × 5.4	55.1	20	5 × 5.4	46	23
10	100	5 × 5.4	30.2	28	5 × 5.4	25.9	30	6.3 × 5.4	22	34
22	220	6.3 × 5.4	13.7	52	6.3 × 5.4	11.8	54	6.3 × 7.7	9.8	85
33	330	6.3 × 5.4	9.1	63	6.3 × 7.7	7.8	105			
47	470	6.3 × 7.7	6.4	100	6.3 × 7.7	5.5	110			

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

Frequency 頻率	~50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系數	0.70	1.00	1.17	1.36	1.50

- Taping specifications are given in page 10. 編帶標準請參閱第 10 頁。
- Please refer to page 11 for the minimum package quantity. 最小包裝數量請參閱第 11 頁。

NOTE: All designs and specifications are for reference only and are subject to change without prior notice. If any doubt about safety for your application, please contact us immediately for technical assistance before purchase.

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BI-POLARIZED

雙極性品

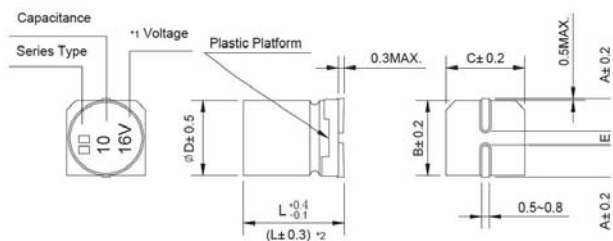
- Bi-polarized with wide temperature range -40°C ~ +105°C
雙極性和適用於 -40°C ~ +105°C 的寬溫範圍
- Load life of 1000 hours
負荷壽命 1000 小時
- Comply with the RoHS directive
符合 RoHS 指令



□ SPECIFICATIONS 特性表

Items 項目	Characteristics 主要特性					
Operation Temperature Range 使用溫度範圍	-40 ~ +105°C					
Voltage Range 額定工作電壓範圍	6.3 ~ 50V					
Capacitance Range 靜電容量範圍	0.1 ~ 100μF					
Capacitance Tolerance 靜電容量允許偏差	±20% at 120Hz, 20°C					
Leakage Current 漏電流	Leakage current ≦ 0.05CV or 10μA, whichever is greater (after 2 minutes application of rated voltage) 漏電流 ≦ 0.05CV 或 10μA, 取較大值 (施加額定工作電壓 2 分鐘後)					
Dissipation Factor (tan δ) 損耗角正切	Measurement frequency 測試頻率: 120Hz, Temperature 溫度: 20°C					
	Rated Voltage (V) 額定工作電壓	6.3	10	16, 25	35, 50	
	tan δ (max.) 最大損耗角正切	0.24	0.20	0.17	0.15	
Stability at Low Temperature 低溫特性	Measurement frequency 測試頻率: 120Hz					
	Rated Voltage (V) 額定工作電壓	6.3	10	16, 25	35, 50	
	Impedance Ratio 阻抗比	Z(-25°C) / Z(20°C)	4	3	2	2
	ZT/Z20 (max.)	Z(-40°C) / Z(20°C)	8	6	4	3
Load Life 高溫負荷特性	After 1000 hours application of the rated voltage at 105°C (the polarity needs to exchange every 250 hours), they meet the characteristics listed below. 在 105°C 環境中施加額定工作電壓 1000 小時 (每 250 小時必須轉換一次極性) 後, 電容器的特性符合下表的要求。					
	Capacitance Change 靜電容量變化率	Within ±20% of initial value 初始值的±20%以內				
	Dissipation Factor 損耗角正切	200% or less of initial specified value 不大於規範值的 200%				
	Leakage Current 漏電流	initial specified value or less 不大於規範值				
Shelf Life 高溫貯存特性	After leaving capacitors under no load at 105°C for 1000 hours, they meet the specified value for load life characteristics listed above. 在 105°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。					
Resistance to Soldering Heat 耐焊接熱特性	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。					
	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 標示	Black print on the case top. 鋁殼頂部黑字印刷。					

□ DRAWING (Unit: mm) 外形圖



- *1. Voltage mark for 6.3V is [6V] 6.3V 的產品標識為 [6V]
 *2. Applicable to Ø6.3×7.7 適用於 Ø6.3×7.7

□ DIMENSIONS (Unit: mm) 尺寸表

ØD x L	4 x 5.4	5 x 5.4	6.3 x 5.4	6.3 x 7.7
A	2.0	2.2	2.6	2.6
B	4.3	5.3	6.6	6.6
C	4.3	5.3	6.6	6.6
E ± 0.2	1.0	1.3	2.1	2.1
L	5.4	5.4	5.4	7.7

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

μF	WV Code 代碼	6.3		10		16		25		35		50	
		0J		1A		1C		1E		1V		1H	
0.1	0R1											4 × 5.4	1.0
0.22	R22											4 × 5.4	2.0
0.33	R33											4 × 5.4	2.8
0.47	R47											4 × 5.4	4.0
1	010											4 × 5.4	8.4
2.2	2R2									4 × 5.4	8.4	5 × 5.4	13
3.3	3R3							5 × 5.4	12	5 × 5.4	16	5 × 5.4	17
4.7	4R7					4 × 5.4	12	5 × 5.4	16	5 × 5.4	18	6.3 × 5.4	20
10	100			4 × 5.4	17	5 × 5.4	23	6.3 × 5.4	27	6.3 × 5.4	29	6.3 × 7.7	36
22	220	5 × 5.4	28	6.3 × 5.4	33	6.3 × 5.4	37	6.3 × 7.7	50	6.3 × 7.7	54		
33	330	6.3 × 5.4	37	6.3 × 5.4	41	6.3 × 5.4	49	6.3 × 7.7	61				
47	470	6.3 × 5.4	45	6.3 × 7.7	61	6.3 × 7.7	75					Case size 尺寸	Ripple current 紋波電流
100	101	6.3 × 7.7	82	6.3 × 7.7	85								

• Case size $\varnothing D \times L$ (mm), ripple current (mA rms) at 105°C 120Hz • 尺寸 $\varnothing D \times L$ (mm), 紋波電流 (mA rms) 於 105°C 120Hz

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

Frequency 頻率	50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系數	0.70	1.00	1.17	1.36	1.50

- Taping specifications are given in page 10. 編帶標準請參閱第 10 頁。
- Please refer to page 11 for the minimum package quantity. 最小包裝數量請參閱第 11 頁

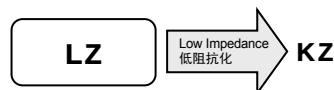
NOTE: All designs and specifications are for reference only and are subject to change without prior notice. If any doubt about safety for your application, please contact us immediately for technical assistance before purchase.

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LOW IMPEDANCE

低阻抗品

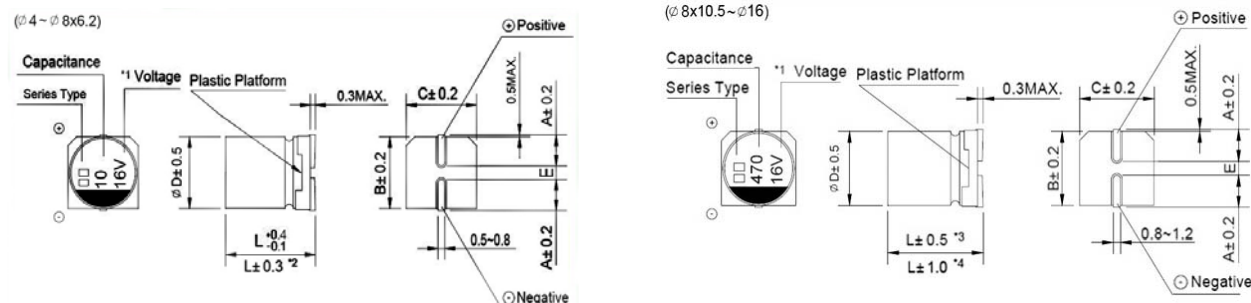
- Low impedance with temperature range -55 ~ +105°C
低阻抗和適用於 -55 ~ +105°C 的溫度範圍
- Load life of 1000 ~ 2000 hours
負荷壽命 1000 ~ 2000 小時
- Comply with the RoHS directive
符合 RoHS 指令



SPECIFICATIONS 特性表

Items 項目	Characteristics 主要特性																																																
Operation Temperature Range 使用溫度範圍	-55 ~ +105°C																																																
Voltage Range 額定工作電壓範圍	6.3 ~ 100V																																																
Capacitance Range 靜電容量範圍	1 ~ 4700μF																																																
Capacitance Tolerance 靜電容量允許偏差	±20% at 120Hz, 20°C																																																
Leakage Current 漏電流	Leakage current (Ø4~Ø10) ≦ 0.01CV or 3μA, whichever is greater (after 2 minutes application of rated voltage) Leakage current (Ø12.5~Ø16) ≦ 0.03CV or 4μA, whichever is greater (after 1 minute application of rated voltage) 漏電流 (Ø4~Ø10) ≦ 0.01CV 或 3μA, 取較大值 (施加額定工作電壓 2 分鐘後) 漏電流 (Ø12.5~Ø16) ≦ 0.03CV 或 4μA, 取較大值 (施加額定工作電壓 1 分鐘後)																																																
Dissipation Factor (tan δ) 損耗角正切	Measurement frequency 測試頻率: 120Hz, Temperature 溫度: 20°C <table><tr><td colspan="2">Rated Voltage (V) 額定工作電壓</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50, 63</td><td>80, 100</td></tr><tr><td>tan δ (max.)</td><td>Ø4~Ø10</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.12</td><td>0.10</td></tr><tr><td>最大損耗角正切</td><td>Ø12.5~Ø16</td><td>0.26</td><td>0.22</td><td>0.18</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td></tr></table>								Rated Voltage (V) 額定工作電壓		6.3	10	16	25	35	50, 63	80, 100	tan δ (max.)	Ø4~Ø10	0.22	0.19	0.16	0.14	0.12	0.12	0.10	最大損耗角正切	Ø12.5~Ø16	0.26	0.22	0.18	0.16	0.14	0.12	0.10														
Rated Voltage (V) 額定工作電壓		6.3	10	16	25	35	50, 63	80, 100																																									
tan δ (max.)	Ø4~Ø10	0.22	0.19	0.16	0.14	0.12	0.12	0.10																																									
最大損耗角正切	Ø12.5~Ø16	0.26	0.22	0.18	0.16	0.14	0.12	0.10																																									
Stability at Low Temperature 低溫特性	Measurement frequency 測試頻率: 120Hz <table><tr><td colspan="2">Rated Voltage (V) 額定工作電壓</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td colspan="3">35~100</td></tr><tr><td rowspan="2">Impedance Ratio 阻抗比</td><td rowspan="2">Ø4~Ø10</td><td>Z(-25°C) / Z(20°C)</td><td>2</td><td>2</td><td>2</td><td>2</td><td colspan="2">2</td></tr><tr><td>Z(-55°C) / Z(20°C)</td><td>5</td><td>4</td><td>4</td><td>3</td><td colspan="2">3</td></tr><tr><td rowspan="2">ZT/Z20 (max.)</td><td rowspan="2">Ø12.5~Ø16</td><td>Z(-25°C) / Z(20°C)</td><td>3</td><td>3</td><td>2</td><td>2</td><td colspan="2">2</td></tr><tr><td>Z(-55°C) / Z(20°C)</td><td>10</td><td>8</td><td>6</td><td>4</td><td colspan="2">3</td></tr></table>								Rated Voltage (V) 額定工作電壓		6.3	10	16	25	35~100			Impedance Ratio 阻抗比	Ø4~Ø10	Z(-25°C) / Z(20°C)	2	2	2	2	2		Z(-55°C) / Z(20°C)	5	4	4	3	3		ZT/Z20 (max.)	Ø12.5~Ø16	Z(-25°C) / Z(20°C)	3	3	2	2	2		Z(-55°C) / Z(20°C)	10	8	6	4	3	
Rated Voltage (V) 額定工作電壓		6.3	10	16	25	35~100																																											
Impedance Ratio 阻抗比	Ø4~Ø10	Z(-25°C) / Z(20°C)	2	2	2	2	2																																										
		Z(-55°C) / Z(20°C)	5	4	4	3	3																																										
ZT/Z20 (max.)	Ø12.5~Ø16	Z(-25°C) / Z(20°C)	3	3	2	2	2																																										
		Z(-55°C) / Z(20°C)	10	8	6	4	3																																										
Load Life 高溫負荷特性	After 2000 hrs. (1000 hrs. for Ø4~Ø6.3×5.4) application of the rated voltage at 105°C, they meet the characteristics listed below. 在 105°C 環境中施加額定工作電壓 2000 小時 (Ø4~Ø6.3×5.4 為 1000 小時) 後, 電容器的特性符合下表的要求。 <table><tr><td>Capacitance Change 靜電容量變化率</td><td>Within ±20% of initial value 初始值的±20%以內</td></tr><tr><td>Dissipation Factor 損耗角正切</td><td>200% or less of initial specified value 不大於規範值的 200%</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 ±20% of initial value 初始值的±20%以內	Dissipation Factor 損耗角正切	200% or less of initial specified value 不大於規範值的 200%	Leakage Current 漏電流	initial specified value or less 不大於規範值																																			
Capacitance Change 靜電容量變化率	Within ±20% of initial value 初始值的±20%以內																																																
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Leakage Current 漏電流	initial specified value or less 不大於規範值																																																
Shelf Life 高溫貯存特性	After leaving capacitors under no load at 105°C for 1000 hours, they meet the specified value for load life characteristics listed above. 在 105°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。																																																
Resistance to Soldering Heat 耐焊接熱特性	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><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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Marking 標示	Black print on the case top. 鋁殼頂部黑字印刷。																																																

DRAWING (Unit: mm) 外形圖



- *1. Voltage mark for 6.3V is [6V] 6.3V 的產品標識為 [6V]
 *2. Applicable to Ø6.3×7.7 適用於 Ø6.3×7.7
 *3. Applicable to Ø8×10.5~Ø10 適用於 Ø8×10.5~Ø10
 *4. Applicable to Ø12.5~Ø16 適用於 Ø12.5~Ø16

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LZ Series

□ DIMENSIONS (Unit: mm) 尺寸表

ØD x L	4 x 5.4	5 x 5.4	6.3 x 5.4	6.3 x 7.7	8 x 6.2	8 x 10.5	10 x 10.5	10 x 12.5	12.5 x 13.5	12.5 x 16	16 x 16.5
A	2.0	2.2	2.6	2.6	3.3	3.0	3.2	3.2	4.6	4.6	5.8
B	4.3	5.3	6.6	6.6	8.3	8.3	10.3	10.3	12.8	12.8	17.0
C	4.3	5.3	6.6	6.6	8.3	8.3	10.3	10.3	12.8	12.8	17.0
E ± 0.2	1.0	1.5	2.1	2.1	2.2	3.1	4.6	4.6	4.6	4.6	6.4
L	5.4	5.4	5.4	7.7	6.2	10.5	10.5	12.5	13.5	16.0	16.5

□ DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT & IMPEDANCE 規格尺寸及最大允許紋波電流及阻抗值

µF	WV Code 代碼	6.3			10			16		
		0J			1A			1C		
10	100							4 x 5.4	3.0	60
15	150							5 x 5.4 (4 x 5.4)	1.8 (3.0)	95 (60)
22	220	4 x 5.4	3.0	60	5 x 5.4 (4 x 5.4)	1.8 (3.0)	95 (60)	5 x 5.4 (4 x 5.4)	1.8 (3.0)	95 (60)
33	330	5 x 5.4 (4 x 5.4)	1.8 (3.0)	95 (60)	5 x 5.4 (4 x 5.4)	1.8 (3.0)	95 (60)	6.3 x 5.4 (5 x 5.4)	1.0 (1.8)	140 (95)
47	470	5 x 5.4 (4 x 5.4)	1.8 (3.0)	95 (60)	6.3 x 5.4 (5 x 5.4)	1.0 (1.8)	140 (95)	6.3 x 5.4 (5 x 5.4)	1.0 (1.8)	140 (95)
68	680	6.3 x 5.4 (5 x 5.4)	1.0 (1.8)	140 (95)	6.3 x 5.4	1.0	140	6.3 x 7.7 (6.3 x 5.4)	0.6 (1.0)	230 (140)
100	101	6.3 x 5.4 (5 x 5.4)	1.0 (1.8)	140 (95)	6.3 x 7.7 (6.3 x 5.4) 5 x 5.4	0.6 (1.0) 1.8	230 (140) 95	6.3 x 7.7 (6.3 x 5.4)	0.6 (1.0)	230 (140)
150	151	6.3 x 7.7 (6.3 x 5.4)	0.6 (1.0)	230 (140)	6.3 x 7.7 (6.3 x 5.4)	0.6 (1.0)	230 (140)	6.3 x 7.7	0.6	230
220	221	6.3 x 7.7 (6.3 x 5.4)	0.6 (1.0)	230 (140)	6.3 x 7.7	0.6	230	8 x 10.5 (6.3 x 7.7) (8 x 6.2)	0.30 (0.6) (0.6)	450 (230) (230)
330	331	6.3 x 7.7	0.6	230	6.3 x 7.7 8 x 10.5	0.60 0.30	230 450	10 x 10.5 (8 x 10.5)	0.15 (0.30)	670 (450)
470	471	8 x 10.5	0.30	450	8 x 10.5	0.30	450	10 x 10.5 (8 x 10.5)	0.15 (0.30)	670 (450)
680	681	8 x 10.5	0.30	450	8 x 10.5 10 x 10.5	0.30 0.15	450 670	10x 10.5	0.15	670
1000	102	10 x 10.5 (8 x 10.5)	0.15 (0.30)	670 (450)	10 x 10.5	0.15	670	10 x 10.5	0.15	670
1500	152	10 x 12.5 (10 x 10.5)	0.13 (0.15)	750 (670)	12.5 x 13.5 (10 x 12.5)	0.11 (0.13)	820 (750)	12.5 x 13.5	0.11	820
2200	222	12.5 x 13.5 (10 x 12.5)	0.11 (0.13)	820 (750)	12.5 x 16	0.09	950	16 x 16.5 (12.5 x 16)	0.08 (0.09)	1260 (950)
3300	332	12.5 x 16 (12.5 x 13.5)	0.09 (0.11)	950 (820)	16 x 16.5	0.08	1260	16 x 16.5	0.08	1260
4700	472	16 x 16.5	0.08	1260	16 x 16.5	0.08	1260			

µF	WV Code 代碼	25			35			50		
		1E			1V			1H		
1	010				4 x 5.4	3.0	60	4 x 5.4	5.0	30
1.5	1R5				4 x 5.4	3.0	60	4 x 5.4	5.0	30
2.2	2R2				4 x 5.4	3.0	60	4 x 5.4	5.0	30
3.3	3R3				4 x 5.4	3.0	60	4 x 5.4	5.0	30
4.7	4R7	4 x 5.4	3.0	60	4 x 5.4	3.0	60	5 x 5.4	3.0	50
6.8	6R8	4 x 5.4	3.0	60	5 x 5.4	1.8	95	6.3 x 5.4	2.0	70
10	100	5 x 5.4 (4 x 5.4)	1.8 (3.0)	95 (60)	5 x 5.4 (4 x 5.4)	1.8 (3.0)	95 (60)	6.3 x 5.4	2.0	70
15	150	6.3 x 5.4	1.8	95	5 x 5.4	1.8	95	6.3 x 5.4	2.0	70
22	220	6.3 x 5.4 (5 x 5.4)	1.0 (1.8)	140 (95)	6.3 x 5.4 (5 x 5.4)	1.0 (1.8)	140 (95)	6.3 x 7.7 (6.3 x 5.4)	1.0 (2.0)	120 (70)
33	330	6.3 x 5.4 (5 x 5.4)	1.0 (1.8)	140 (95)	6.3 x 5.4	1.0	140	6.3 x 7.7	1.0	120
47	470	6.3 x 7.7 (6.3 x 5.4)	0.6 (1.0)	230 (140)	6.3 x 7.7 (6.3 x 5.4)	0.60 (1.0)	230 (140)	6.3 x 7.7 8 x 6.2	1.0 1.0	120 120
68	680	6.3 x 7.7	0.6	230	6.3 x 7.7	0.60	230	8 x 10.5	0.60	300
100	101	8 x 6.2 6.3 x 7.7	0.6 0.6	230 230	8 x 10.5 (6.3 x 7.7)	0.30 0.6	450 (260)	8 x 10.5	0.60	300
150	151	8 x 10.5 (6.3 x 7.7)	0.30 (0.6)	450 (230)	8 x 10.5	0.30	450	10 x 10.5	0.30	500
								Case size ØD x L (mm) 尺寸	Impedance (Ω) at 20°C 100KHz 阻抗值	Ripple current (mA rms) at 105°C 100KHz 紋波電流

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注: 以上所提供的設計及特性參數僅供參考，任何修改不作預先通知。如果在使用上有疑問，請在採購前與我們聯繫，以便提供技術上的協助。

LZ Series

□ DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT & IMPEDANCE 規格尺寸及最大允許紋波電流及阻抗值

μF	Code 代碼	25			35			50		
		1E			1V			1H		
220	221	8 × 10.5	0.30	450	10 × 10.5 (8 × 10.5)	0.15 (0.30)	670 (450)	10 × 10.5	0.30	500
330	331	10 × 10.5 (8 × 10.5)	0.15 (0.30)	670 (450)	10 × 10.5	0.15	670	16 × 16.5 (12.5 × 13.5) (10 × 12.5)	0.12 (0.20) (0.25)	1060 (650) (580)
470	471	10 × 10.5	0.15	670	10 × 10.5	0.15	670	16 × 16.5 (12.5 × 16)	0.12 (0.15)	1060 (700)
680	681	10 × 12.5	0.13	750	12.5 × 13.5 (10 × 12.5)	0.11 (0.13)	820 (750)	16 × 16.5	0.12	1060
1000	102	16 × 16.5 (12.5 × 13.5)	0.08 (0.11)	1260 (820)	16 × 16.5 (12.5 × 16)	0.08 (0.09)	1260 (950)			
1500	152	12.5 × 16	0.09	950	16 × 16.5	0.08	1260	Case size ØD×L(mm) 尺寸	Impedance (Ω) at 20°C 100KHz 阻抗值	Ripple current (mA rms) at 105°C 100KHz 紋波電流
2200	222	16 × 16.5	0.08	1260						

μF	Code 代碼	63			80			100		
		1J			1K			2A		
10	100	6.3 × 7.7	1.5	95				6.3 × 7.7	4.0	65
22	220	6.3 × 7.7	1.0	130	6.3 × 7.7	2.0	130	10 × 10.5	0.65	350
47	470	8 × 10.5	0.65	250				12.5 × 13.5	0.60	500
100	101	10 × 10.5	0.50	430				Case size ØD×L(mm) 尺寸	Impedance (Ω) at 20°C 100KHz 阻抗值	Ripple current (mA rms) at 105°C 100KHz 紋波電流
220	221	12.5 × 13.5	0.30	550						

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

Frequency 頻率			50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系數	Ø4 ~ Ø10	1 ~ 68μF	0.35	0.50	0.64	0.83	1.00
		100 ~ 2200μF	0.40	0.55	0.70	0.85	1.00
	Ø12.5 ~ Ø16	~ 680μF	0.45	0.65	0.80	0.90	1.00
		1000 ~ 4700μF	0.65	0.85	0.95	1.00	1.00

- Taping specifications are given in page 10. 編帶標準請參閱第 10 頁。
- Please refer to page 11 for the minimum package quantity. 最小包裝數量請參閱第 11 頁。

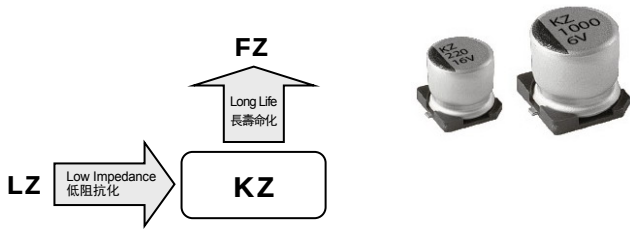
NOTE: All designs and specifications are for reference only and are subject to change without prior notice. If any doubt about safety for your application, please contact us immediately for technical assistance before purchase.

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EXTRA LOWER IMPEDANCE

極低阻抗品

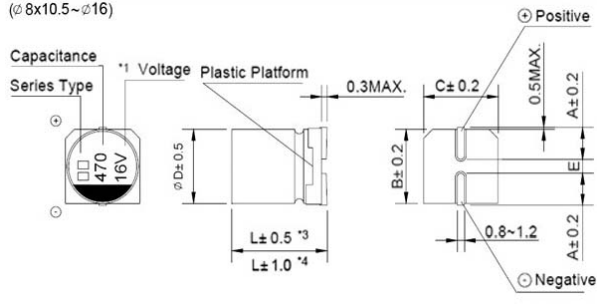
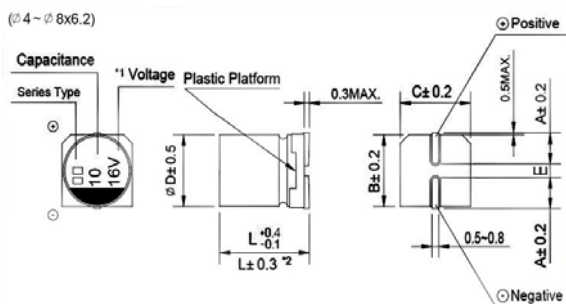
- Extra low impedance with temperature range -55 ~ +105°C
極低阻抗和適用於 -55 ~ +105°C 的溫度範圍
- Impedance 40~60% less than LZ series
阻抗值比 LZ 系列低 40~60%
- Comply with the RoHS directive
符合 RoHS 指令



□ SPECIFICATIONS 特性表

Items 項目	Characteristics 主要特性																																												
Operation Temperature Range 使用溫度範圍	-55 ~ +105°C																																												
Voltage Range 額定工作電壓範圍	6.3 ~ 50V																																												
Capacitance Range 靜電容量範圍	4.7 ~ 4700μF																																												
Capacitance Tolerance 靜電容量允許偏差	±20% at 120Hz, 20°C																																												
Leakage Current 漏電流	Leakage current (Ø4~Ø10) ≦0.01CV or 3μA, whichever is greater (after 2 minutes application of rated voltage) Leakage current (Ø12.5~Ø16) ≦0.03CV or 4μA, whichever is greater (after 1 minute application of rated voltage) 漏電流 (Ø4~Ø10) ≦0.01CV 或 3μA, 取較大值 (施加額定工作電壓 2 分鐘後) 漏電流 (Ø12.5~Ø16) ≦0.03CV 或 4μA, 取較大值 (施加額定工作電壓 1 分鐘後)																																												
Dissipation Factor (tan δ) 損耗角正切	Measurement frequency 測試頻率: 120Hz, Temperature 溫度: 20°C <table><tr><td>Rated Voltage (V) 額定工作電壓</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>tan δ (max.)</td><td>Ø4~Ø10</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td></tr><tr><td>最大損耗角正切</td><td>Ø12.5~Ø16</td><td>0.26</td><td>0.22</td><td>0.18</td><td>0.16</td><td>0.14</td></tr></table>							Rated Voltage (V) 額定工作電壓	6.3	10	16	25	35	50	tan δ (max.)	Ø4~Ø10	0.22	0.19	0.16	0.14	0.12	最大損耗角正切	Ø12.5~Ø16	0.26	0.22	0.18	0.16	0.14																	
Rated Voltage (V) 額定工作電壓	6.3	10	16	25	35	50																																							
tan δ (max.)	Ø4~Ø10	0.22	0.19	0.16	0.14	0.12																																							
最大損耗角正切	Ø12.5~Ø16	0.26	0.22	0.18	0.16	0.14																																							
Stability at Low Temperature 低溫特性	Measurement frequency 測試頻率: 120Hz <table><tr><td colspan="2">Rated Voltage (V) 額定工作電壓</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td rowspan="2">Impedance Ratio 阻抗比 ZT/Z20 (max.)</td><td>Ø4~Ø10</td><td>Z(-25°C) / Z(20°C)</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td></tr><tr><td></td><td>Z(-55°C) / Z(20°C)</td><td>5</td><td>4</td><td>4</td><td>3</td><td>3</td></tr><tr><td></td><td rowspan="2">Ø12.5~Ø16</td><td>Z(-25°C) / Z(20°C)</td><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td></tr><tr><td></td><td>Z(-55°C) / Z(20°C)</td><td>10</td><td>8</td><td>6</td><td>4</td><td>3</td></tr></table>							Rated Voltage (V) 額定工作電壓		6.3	10	16	25	35	50	Impedance Ratio 阻抗比 ZT/Z20 (max.)	Ø4~Ø10	Z(-25°C) / Z(20°C)	2	2	2	2	2		Z(-55°C) / Z(20°C)	5	4	4	3	3		Ø12.5~Ø16	Z(-25°C) / Z(20°C)	3	3	2	2	2		Z(-55°C) / Z(20°C)	10	8	6	4	3
Rated Voltage (V) 額定工作電壓		6.3	10	16	25	35	50																																						
Impedance Ratio 阻抗比 ZT/Z20 (max.)	Ø4~Ø10	Z(-25°C) / Z(20°C)	2	2	2	2	2																																						
		Z(-55°C) / Z(20°C)	5	4	4	3	3																																						
	Ø12.5~Ø16	Z(-25°C) / Z(20°C)	3	3	2	2	2																																						
		Z(-55°C) / Z(20°C)	10	8	6	4	3																																						
Load Life 高溫負荷特性	After 3000 hrs. (2000 hrs. for Ø4~Ø6.3×5.4&Ø6.3×7.7) application of the rated voltage at 105°C, they meet the characteristics listed below. 在 105°C 環境中施加額定工作電壓 3000 小時 (Ø4~Ø6.3×5.4&Ø6.3×7.7 為 2000 小時) 後, 電容器的特性符合下表的要求。 <table><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																																
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 高溫貯存特性	After leaving capacitors under no load at 105°C for 1000 hours, they meet the specified value for load life characteristics listed above. 在 105°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。																																												
Resistance to Soldering Heat 耐焊接熱特性	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><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																																
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 標示	Black print on the case top. 鋁殼頂部黑字印刷。																																												

□ DRAWING (Unit: mm) 外形圖



- *1. Voltage mark for 6.3V is [6V] 6.3V 的產品標識為 [6V]
*2. Applicable to Ø6.3x7.7 適用於 Ø6.3x7.7
*3. Applicable to Ø8x10.5~Ø10 適用於 Ø8x10.5~Ø10
*4. Applicable to Ø12.5~Ø16 適用於 Ø12.5~Ø16

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KZ Series

□ DIMENSIONS (Unit: mm) 尺寸表

∅D x L	4 x 5.4	5 x 5.4	6.3 x 5.4	6.3 x 7.7	8 x 6.2	8 x 10.5	10 x 10.5	10 x 12.5	12.5 x 13.5	12.5 x 16	16 x 16.5
A	2.0	2.2	2.6	2.6	3.3	3.0	3.2	3.2	4.6	4.6	5.8
B	4.3	5.3	6.6	6.6	8.3	8.3	10.3	10.3	12.8	12.8	17.0
C	4.3	5.3	6.6	6.6	8.3	8.3	10.3	10.3	12.8	12.8	17.0
E ± 0.2	1.0	1.5	2.1	2.1	2.2	3.1	4.6	4.6	4.6	4.6	6.4
L	5.4	5.4	5.4	7.7	6.2	10.5	10.5	12.5	13.5	16.0	16.5

□ DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT & IMPEDANCE 規格尺寸及最大允許紋波電流及阻抗值

WV Code 代碼	μF	6.3			10			16		
		0J			1A			1C		
10	100							4 x 5.4	1.8	80
15	150							4 x 5.4	1.8	80
22	220	4 x 5.4	1.8	80	4 x 5.4	1.8	80	5 x 5.4 (4 x 5.4)	0.76 (1.8)	150 (80)
33	330	5 x 5.4 (4 x 5.4)	0.76 (1.8)	150 (80)	5 x 5.4 (4 x 5.4)	0.76 (1.8)	150 (80)	6.3 x 5.4 (5 x 5.4)	0.44 (0.76)	230 (150)
47	470	5 x 5.4 (4 x 5.4)	0.76 (1.8)	150 (80)	6.3 x 5.4 (5 x 5.4)	0.44 (0.76)	230 (150)	6.3 x 5.4 (5 x 5.4)	0.44 (0.76)	230 (150)
56	560	5 x 5.4	0.76	150	6.3 x 5.4	0.44	230	6.3 x 5.4	0.44	230
68	680	6.3 x 5.4 (5 x 5.4)	0.44 (0.76)	230 (150)	6.3 x 5.4	0.44	230	6.3 x 7.7 (6.3 x 5.4) (8 x 6.2)	0.34 (0.44) (0.34)	280 (230) (280)
100	101	6.3 x 5.4 (5 x 5.4)	0.44 (0.76)	230 (150)	6.3 x 7.7 (6.3 x 5.4) (8 x 6.2)	0.34 (0.44) (0.34)	280 (230) (280)	6.3 x 7.7 (6.3 x 5.4) (8 x 6.2)	0.34 (0.44) (0.34)	280 (230) (280)
150	151	6.3 x 5.4	0.44	230	6.3 x 7.7	0.34	280	6.3 x 7.7	0.34	280
220	221	6.3 x 7.7 (6.3 x 5.4) (8 x 6.2)	0.34 (0.44) (0.34)	280 (230) (280)	6.3 x 7.7 (8 x 6.2)	0.34 (0.34)	280 (280)	8 x 10.5 (6.3 x 7.7)	0.17 (0.34)	450 (280)
330	331	6.3 x 7.7 (8 x 6.2)	0.34 (0.34)	280 (280)	8 x 10.5	0.17	450	10 x 10.5 (8 x 10.5)	0.09 (0.17)	670 (450)
470	471	8 x 10.5	0.17	450	8 x 10.5	0.17	450	10 x 10.5 (8 x 10.5)	0.09 (0.17)	670 (450)
680	681	10 x 10.5 (8 x 10.5)	0.09 (0.17)	670 (450)	10 x 10.5	0.09	670	10 x 12.5 (10 x 10.5)	0.075 (0.09)	800 (670)
1000	102	10 x 10.5 (8 x 10.5)	0.09 (0.17)	670 (450)	10 x 10.5	0.09	670	16 x 16.5 (12.5 x 16) (12.5 x 13.5)	0.055 (0.06) (0.065)	1350 (1050) (900)
1500	152	10 x 12.5 (10 x 10.5)	0.075 (0.09)	800 (670)	12.5 x 13.5	0.065	900	16 x 16.5	0.055	1350
2200	222	12.5 x 13.5	0.065	900	12.5 x 16	0.060	1050	16 x 16.5	0.055	1350
3300	332	12.5 x 16	0.060	1050	16 x 16.5	0.055	1350			
4700	472	16 x 16.5	0.055	1350						

WV Code 代碼	μF	25			35			50		
		1E			1V			1H		
4.7	4R7				4 x 5.4	1.8	80	5 x 5.4 (4 x 5.4)	1.52 (3.0)	85 (60)
10	100	4 x 5.4	1.8	80	5 x 5.4 (4 x 5.4)	0.76 (1.8)	150 (80)	6.3 x 5.4 (5 x 5.4)	0.88 (1.52)	165 (85)
15	150	5 x 5.4	0.76	150	5 x 5.4	0.76	150	6.3 x 5.4	0.88	165
22	220	6.3 x 5.4 (5 x 5.4)	0.44 (0.76)	230 (150)	6.3 x 5.4 (5 x 5.4)	0.44 (0.76)	230 (150)	6.3 x 7.7 (6.3 x 5.4) (8 x 6.2)	0.68 (0.88) (0.68)	185 (165) (185)
33	330	6.3 x 5.4 (5 x 5.4)	0.44 (0.76)	230 (150)	6.3 x 5.4 (8 x 6.2)	0.44 (0.34)	230 (280)	6.3 x 7.7 (8 x 6.2)	0.68 (0.68)	185 (185)
47	470	6.3 x 7.7 (6.3 x 5.4) (8 x 6.2)	0.34 (0.44) (0.34)	280 (230) (280)	6.3 x 7.7 (6.3 x 5.4) (8 x 6.2)	0.34 (0.44) (0.34)	280 (230) (280)	6.3 x 7.7 (8 x 6.2)	0.68 (0.68)	185 (185)
56	560	6.3 x 7.7 (6.3 x 5.4)	0.34 (0.44)	280 (230)	6.3 x 7.7	0.34	280	8 x 10.5 (6.3 x 7.7)	0.34 (0.68)	350 (185)
68	680	6.3 x 7.7	0.34	280	6.3 x 7.7	0.34	280	8 x 10.5	0.34	350
100	101	6.3 x 7.7 (8 x 6.2)	0.34 (0.34)	280 (280)	6.3 x 7.7 (8 x 10.5)	0.34 (0.17)	280 (450)	10 x 10.5 (8 x 10.5)	0.18 (0.34)	670 (350)
150	151	8 x 10.5 (6.3 x 7.7)	0.17 (0.34)	450 (280)	10 x 10.5	0.09	670	10 x 10.5	0.18	670
								Case size ∅D x L (mm) 尺寸	Impedance (Ω) at 20°C 100KHz 阻抗值	Ripple current (mA rms) at 105°C 100KHz 紋波電流

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□ DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT & IMPEDANCE 規格尺寸及最大允許紋波電流及阻抗值

μF	WV Code 代碼	25			35			50		
		1E			1V			1H		
220	221	8 × 10.5	0.17	450	8 × 10.5 10 × 10.5	0.17 0.09	600 670	10 × 12.5 (10 × 10.5)	0.16 (0.18)	750 (670)
330	331	10 × 10.5 (8 × 10.5)	0.09 (0.17)	670 (450)	10 × 10.5	0.09	670	12.5×13.5	0.14	800
470	471	10 × 12.5 (10 × 10.5)	0.075 (0.09)	800 (670)	12.5×13.5 (10×12.5)	0.065 (0.075)	900 (800)	16×16.5 (12.5×16)	0.10 (0.12)	1150 (900)
680	681	12.5×13.5	0.065	900	12.5×16 (12.5×13.5)	0.060 (0.065)	1050 (900)			
1000	102	16×16.5 (12.5×16)	0.055 (0.060)	1350 (1050)	16×16.5	0.055	1350	Case size ØD×L(mm) 尺寸	Impedance (Ω) at 20°C 100KHz 阻抗值	Ripple current (mA rms) at 105°C 100KHz 紋波電流
1500	152	16×16.5	0.055	1350						

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

Frequency 頻率			50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系數	Ø4 ~ Ø10	4.7 ~ 68μF	0.35	0.50	0.64	0.83	1.00
		100 ~ 1500μF	0.40	0.55	0.70	0.85	1.00
	Ø12.5 ~ Ø16	~ 680μF	0.45	0.65	0.80	0.90	1.00
		1000 ~ 4700μF	0.65	0.85	0.95	1.00	1.00

- Taping specifications are given in page 10. 編帶標準請參閱第 10 頁。
- Please refer to page 11 for the minimum package quantity. 最小包裝數量請參閱第 11 頁。

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LONG LIFE WITH EXTRA LOWER IMPEDANCE

長壽命極低阻抗品

- Extra low impedance with temperature range -55 ~ +105°C
極低阻抗和適用於 -55 ~ +105°C 的溫度範圍
- Load life of 2000~5000 hours
負荷壽命 2000~5000 小時
- Impedance 5~25% less than KZ series
阻抗值比 KZ 系列低 5~25%
- Comply with the RoHS directive
符合 RoHS 指令

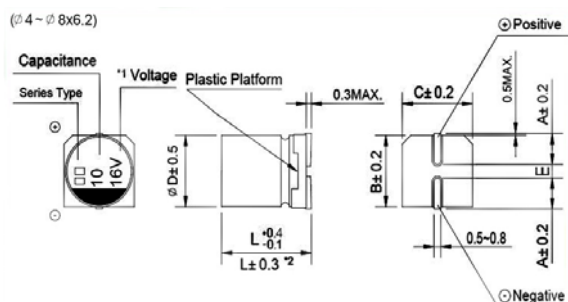


□ SPECIFICATIONS 特性表

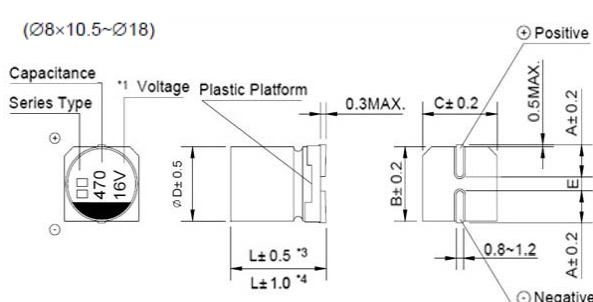
Items 項目	Characteristics 主要特性																													
Operation Temperature Range 使用溫度範圍	-55 ~ +105°C																													
Voltage Range 額定工作電壓範圍	6.3 ~ 100V																													
Capacitance Range 靜電容量範圍	3.3 ~ 8200μF																													
Capacitance Tolerance 靜電容量允許偏差	±20% at 120Hz, 20°C																													
Leakage Current 漏電流	Leakage current (∅4~∅10) ≦0.01CV or 3μA, whichever is greater (after 2 minutes application of rated voltage) Leakage current (∅12.5~∅16) ≦0.03CV or 4μA, whichever is greater (after 1 minute application of rated voltage) 漏電流 (∅4~∅10) ≦0.01CV 或 3μA, 取較大值（施加額定工作電壓 2 分鐘後） 漏電流 (∅12.5~∅16) ≦0.03CV 或 4μA, 取較大值（施加額定工作電壓 1 分鐘後）																													
Dissipation Factor (tan δ) 損耗角正切	Measurement frequency 測試頻率: 120Hz, Temperature 溫度: 20°C <table><tr><td>Rated Voltage (V) 額定工作電壓</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63~80</td><td>100</td></tr><tr><td>tan δ (max.)</td><td>∅4~∅10</td><td>0.26</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.08</td><td>0.07</td></tr><tr><td>最大損耗角正切</td><td>∅12.5~∅16</td><td>0.26</td><td>0.19</td><td>0.18</td><td>0.16</td><td>0.14</td><td>0.10</td><td>0.08</td><td>0.07</td></tr></table>	Rated Voltage (V) 額定工作電壓	6.3	10	16	25	35	50	63~80	100	tan δ (max.)	∅4~∅10	0.26	0.19	0.16	0.14	0.12	0.10	0.08	0.07	最大損耗角正切	∅12.5~∅16	0.26	0.19	0.18	0.16	0.14	0.10	0.08	0.07
Rated Voltage (V) 額定工作電壓	6.3	10	16	25	35	50	63~80	100																						
tan δ (max.)	∅4~∅10	0.26	0.19	0.16	0.14	0.12	0.10	0.08	0.07																					
最大損耗角正切	∅12.5~∅16	0.26	0.19	0.18	0.16	0.14	0.10	0.08	0.07																					
Stability at Low Temperature 低溫特性	Measurement frequency 測試頻率: 120Hz <table><tr><td>Rated Voltage (V) 額定工作電壓</td><td>63~16</td><td>25~100</td></tr><tr><td>Impedance Ratio 阻抗比</td><td>Z(-25°C) / Z(20°C)</td><td>2</td><td>2</td></tr><tr><td></td><td>Z(-40°C) / Z(20°C)</td><td>3</td><td>3</td></tr><tr><td>ZT/Z20 (max.)</td><td>Z(-55°C) / Z(20°C)</td><td>4</td><td>3</td></tr></table>	Rated Voltage (V) 額定工作電壓	63~16	25~100	Impedance Ratio 阻抗比	Z(-25°C) / Z(20°C)	2	2		Z(-40°C) / Z(20°C)	3	3	ZT/Z20 (max.)	Z(-55°C) / Z(20°C)	4	3														
Rated Voltage (V) 額定工作電壓	63~16	25~100																												
Impedance Ratio 阻抗比	Z(-25°C) / Z(20°C)	2	2																											
	Z(-40°C) / Z(20°C)	3	3																											
ZT/Z20 (max.)	Z(-55°C) / Z(20°C)	4	3																											
Load Life 高溫負荷特性	After 5000 hrs. (2000 hrs. for ∅4~∅6.3×5.4 ∅6.3×7.7&∅8×6.2) application of the rated voltage at 105°C, they meet the characteristics listed below. 在 105°C 環境中施加額定工作電壓 5000 小時（∅4~∅6.3×5.4 ∅6.3×7.7 和 ∅8×6.2 為 2000 小時）後，電容器的特性符合下表的要求。 <table><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																							
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 高溫貯存特性	After leaving capacitors under no load at 105°C for 1000 hours, they meet the specified value for load life characteristics listed above. 在 105°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。																													
Resistance to Soldering Heat 耐焊接熱特性	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><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																							
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 標示	Black print on the case top. 鋁殼頂部黑字印刷。																													

□ DRAWING (Unit: mm) 外形圖

適用於∅6.3×7.7



- *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~∅16 適用於∅12.5~∅16



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FZ 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 6.2	8 x 10.5	10 x 10.5	10 x 12.5	12.5 x 13.5	12.5 x 16	16 x 16.5	18 x 16.5/18.5
A	2.0	2.2	2.6	3.3	3.0	3.2	3.2	4.6	4.6	5.8	6.2
B	4.3	5.3	6.6	8.3	8.3	10.3	10.3	12.8	12.8	17.0	19.0
C	4.3	5.3	6.6	8.3	8.3	10.3	10.3	12.8	12.8	17.0	19.0
E ± 0.2	1.0	1.5	2.1	2.2	3.1	4.6	4.6	4.6	4.6	6.4	6.4
L	5.4	5.4	5.4/7.7	6.2	10.5	10.5	12.5	13.5	16.0	16.5	16.5/18.5

□ DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT & IMPEDANCE 規格尺寸及最大允許紋波電流及阻抗值

WV Code 代碼	µF	6.3			10			16		
		0J			1A			1C		
10	100							4 x 5.8	1.35	90
15	150							4 x 5.8	1.35	90
22	220	4 x 5.8	1.35	90	4 x 5.8	1.35	90	5 x 5.8 (4 x 5.8)	0.70 (1.35)	160 (90)
33	330	5 x 5.8 (4 x 5.8)	0.70 (1.35)	160 (90)	5 x 5.8 (4 x 5.8)	0.70 (1.35)	160 (90)	6.3 x 5.8 (5 x 5.8)	0.36 (0.70)	240 (160)
47	470	5 x 5.8 (4 x 5.8)	0.70 (1.35)	160 (90)	6.3 x 5.8 (5 x 5.8)	0.36 (0.70)	240 (160)	6.3 x 5.8 (5 x 5.8)	0.36 (0.70)	240 (160)
56	560	5 x 5.8	0.70	160	6.3 x 5.8	0.36	240	6.3 x 5.8	0.36	240
68	680	6.3 x 5.8 (5 x 5.8)	0.36 (0.70)	240 (160)	6.3 x 5.8	0.36	240	6.3 x 7.7 (6.3 x 5.8)	0.26 (0.36)	300 (240)
100	101	6.3 x 5.8 (5 x 5.8)	0.36 (0.70)	240 (160)	6.3 x 7.7 (6.3 x 5.8)	0.26 (0.36)	300 (240)	6.3 x 7.7 (6.3 x 5.8)	0.26 (0.36)	300 (240)
150	151	6.3 x 5.8	0.36	240	6.3 x 7.7	0.26	300	6.3 x 7.7	0.26	300
220	221	6.3 x 7.7 (6.3 x 5.8) (8 x 6.2)	0.26 (0.36) (0.26)	300 (240) (300)	6.3 x 5.8 6.3 x 7.7 (8 x 6.2)	0.36 0.26 (0.26)	240 300 (300)	8 x 10.5 (6.3 x 7.7)	0.16 (0.26)	600 (300)
330	331	6.3 x 7.7 (8 x 6.2)	0.26 (0.26)	300 (300)	10 x 10.5 (8 x 10.5)	0.08 (0.16)	850 (600)	10 x 10.5 (8 x 10.5)	0.08 (0.16)	850 (600)
470	471	8 x 10.5	0.16	600	10 x 10.5 (8 x 10.5)	0.08 (0.16)	850 (600)	10 x 10.5 (8 x 10.5)	0.08 (0.16)	850 (600)
680	681	10 x 10.5 (8 x 10.5)	0.08 (0.16)	850 (600)	10 x 10.5	0.08	850	10 x 12.5 (10 x 10.5)	0.07 (0.08)	950 (850)
1000	102	10 x 10.5 (8 x 10.5)	0.08 (0.16)	850 (600)	10 x 12.5 (10 x 10.5)	0.07 (0.08)	950 (850)	16 x 16.5 (12.5 x 16) (12.5 x 13.5)	0.05 (0.055) (0.06)	1450 (1200) (1100)
1500	152	10 x 12.5 (10 x 10.5)	0.07 (0.08)	950 (850)	12.5 x 13.5	0.06	1100	16 x 16.5	0.05	1450
2200	222	12.5 x 13.5	0.06	1100	12.5 x 16	0.055	1200	16 x 16.5	0.05	1450
3300	332	12.5 x 16	0.055	1200	16 x 16.5	0.05	1450	16 x 16.5	0.05	1450
4700	472	16 x 16.5	0.05	1450	16 x 16.5	0.05	1450	18 x 16.5	0.048	1500
6800	682	18 x 16.5	0.048	1500	18 x 16.5	0.048	1500	Case size ØD x L (mm) 尺寸	Impedance 阻 抗值	Ripple current 紋 波電流
8200	822	18 x 16.5	0.048	1500						

WV Code 代碼	µF	25			35			50		
		1E			1V			1H		
4.7	4R7				4 x 5.8	1.35	90	5 x 5.8 (4 x 5.8)	1.52 (2.9)	85 (60)
10	100	4 x 5.8	1.35	90	5 x 5.8 (4 x 5.8)	0.70 (1.35)	160 (90)	6.3 x 5.8 (5 x 5.8) 8 x 10.5	0.88 (1.52) 0.68	165 (85) 195
15	150	5 x 5.8	0.70	160	5 x 5.8	0.70	160	6.3 x 5.8	0.88	165
22	220	6.3 x 5.8 (5 x 5.8)	0.36 (0.70)	240 (160)	6.3 x 5.8 (5 x 5.8)	0.36 (0.70)	240 (160)	6.3 x 7.7 (6.3 x 5.8) (8 x 6.2) 8 x 10.5	0.68 (0.88) (0.68) 0.68	195 (165) (195) 195
33	330	6.3 x 5.8 (5 x 5.8)	0.36 (0.70)	240 (160)	6.3 x 5.8 (8 x 6.2)	0.36 (0.26)	240 (300)	6.3 x 7.7 (8 x 6.2)	0.68 (0.68)	195 (195)
47	470	6.3 x 7.7 (6.3 x 5.8) (8 x 6.2) 8 x 10.5	0.26 (0.36) (0.26) 0.26	300 (240) (300) 300	6.3 x 7.7 (6.3 x 5.8) (8 x 6.2)	0.26 (0.36) (0.26)	300 (240) (300)	6.3 x 7.7 (8 x 6.2)	0.68 (0.68)	195 (195)
56	560	6.3 x 7.7 (6.3 x 5.8)	0.26 (0.36)	300 (240)	6.3 x 7.7	0.26	300	8 x 10.5	0.34	350
68	680	6.3 x 7.7	0.26	300	6.3 x 7.7	0.26	300	8 x 10.5	0.34	350
100	101	6.3 x 7.7 (8 x 6.2) 8 x 10.5	0.26 (0.26) 0.26	300 (300) 300	8 x 10.5	0.16	600	10 x 10.5 (8 x 10.5)	0.18 (0.34)	670 (350)
150	151	8 x 10.5 (6.3 x 7.7)	0.16 (0.26)	600 (300)	10 x 10.5 (8 x 10.5)	0.08 (0.16)	850 (600)	10 x 10.5	0.18	670
								Case size ØD x L (mm) 尺寸	Impedance 阻 抗值	Ripple current 紋 波電流

• Case size 尺寸 ØD x L (mm), impedance 阻抗值 (Ω) at 20°C 100KHz, ripple current 紋波電流 (mA rms) at 105°C 100KHz

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FZ Series

□ DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT & IMPEDANCE 規格尺寸及最大允許紋波電流及阻抗值

μF	WV Code 代碼	25			35			50		
		1E			1V			1H		
220	221	8 × 10.5	0.16	600	10 × 10.5 (8 × 10.5)	0.08 (0.16)	850 (600)	10 × 12.5 (10 × 10.5)	0.14 (0.18)	780 (670)
330	331	(10 × 10.5) 8 × 10.5	0.08 (0.16)	850 (600)	10 × 10.5	0.08	850	12.5 × 13.5	0.12	900
470	471	10 × 13.5 (10 × 10.5)	0.07 (0.09)	950 (850)	12.5 × 13.5 (10 × 13.5) (10 × 10.5)	0.06 (0.07) (0.10)	1100 (1000) (950)	16 × 16.5 (12.5 × 16) (12.5 × 13.5)	0.08 (0.10) (0.08)	1250 (1050) (1100)
680	681	12.5 × 13.5	0.06	1100	12.5 × 16 (12.5 × 13.5)	0.055 (0.06)	1200 (1100)	16 × 16.5	0.073	1250
1000	102	16 × 16.5 (12.5 × 16) (12.5 × 13.5)	0.05 (0.055) (0.06)	1450 (1200) (1100)	16 × 16.5	0.05	1450	18 × 18.5 (16 × 16.5) (18 × 16.5)	0.073 (0.08) (0.073)	1250 (1000) (1250)
1500	152	16 × 16.5	0.05	1450	16 × 16.5	0.048	1500	18 × 16.5	0.066	1500
2200	222	16 × 16.5	0.05	1450	18 × 18.5	0.038	1750	Case size 尺寸	Impedance 阻抗值	Ripple current 紋波電流
3300	333	18 × 16.5 (18 × 18.5)	0.048 (0.048)	1500 (1500)						

μF	WV Code 代碼	63			80			100		
		1J			1K			2A		
470	471	10 × 12.5 (10 × 10.5)	0.07 (0.08)	950 (850)	12.5 × 13.5 (10 × 12.5)	0.06 (0.07)	1100 (950)	16 × 16.5 (12.5 × 16)	0.08 (0.10)	1250 (1050)
680	681	12.5 × 13.5	0.06	1100	12.5 × 13.5 12.5 × 16	0.06 0.055	1100 1200			
1000	102	16 × 16.5 (12.5 × 16)	0.05 (0.055)	1450 (1200)	16 × 16.5	0.05	1450			
1500	152	16 × 16.5	0.05	1450						
3.3	3R3				5 × 5.8	5.0	25			
4.7	4R7	5 × 5.8	3.0	50	6.3 × 5.8	3.0	40			
10	100	6.3 × 7.7 (6.3 × 5.8)	1.2 (1.5)	120 (80)	6.3 × 7.7 (8 × 6.2)	2.4 (2.4)	60 (80)	8 × 10.5	1.3	130
22	220	8 × 10.5 6.3 × 7.7 (8 × 6.2)	0.65 (1.2) (1.2)	250 (120) (120)	8 × 10.5	1.3	130	10 × 10.5 (8 × 10.5)	0.7 (1.3)	200 (130)
33	330	8 × 10.5	0.65	250	8 × 10.5	1.3	130	10 × 10.5	0.7	200
47	470	8 × 10.5	0.65	250	10 × 10.5	0.7	200	12.5 × 13.5 (10 × 12.5)	0.32 (0.60)	500 (250)
68	680	12.5 × 13.5 (8 × 10.5)	0.16 (0.65)	800 (250)	12.5 × 13.5	0.32	500	12.5 × 13.5	0.32	500
100	101	12.5 × 13.5 (10 × 10.5)	0.16 (0.35)	800 (400)	12.5 × 13.5	0.32	500	16 × 16.5 (12.5 × 16) 12.5 × 13.5	0.17 (0.26) 0.32	795 (550) 500
150	151	12.5 × 13.5 (10 × 10.5)	0.16 (0.25)	800 (650)	12.5 × 13.5	0.32	500	16 × 16.5 (12.5 × 16)	0.17 (0.26)	650 (550)
220	221	12.5 × 13.5	0.16 (0.25)	800 (650)	12.5 × 16	0.26	550	18 × 16.5	0.15	850
330	331	16 × 16.5	0.082	1400	16 × 16.5	0.17	795	18 × 16.5	0.15	850
470	471	16 × 16.5	0.082	900	18 × 16.5	0.15	850	18 × 18.5	0.15	950
680	681	18 × 16.5	0.08	1150	18 × 18.5	0.15	950	Case size 尺寸	Impedance 阻抗值	Ripple current 紋波電流
1000	102	18 × 18.5	0.06	1250						

• Case size 尺寸 $\varnothing D \times L$ (mm), impedance 阻抗值 (Ω) at 20°C 100KHz, ripple current 紋波電流 (mA rms) at 105°C 100KHz

□ FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT 紋波電流頻率補償係數

Frequency 頻率			50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 係數	$\varnothing 4 \sim \varnothing 10$	4.7 ~ 68μF	0.35	0.50	0.64	0.83	1.00
		100 ~ 1500μF	0.40	0.55	0.70	0.85	1.00
	$\varnothing 12.5 \sim \varnothing 16$	~ 680μF	0.40	0.55	0.70	0.85	1.00
		100 ~ 680μF	0.45	0.65	0.80	0.90	1.00
		1000 ~ 4700μF	0.65	0.85	0.95	1.00	1.00

- Taping specifications are given in page 10. 編帶標準請參閱第 10 頁。
- Please refer to page 11 for the minimum package quantity. 最小包裝數量請參閱第 11 頁。

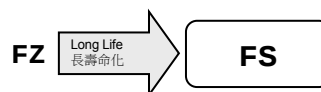
NOTE: All designs and specifications are for reference only and are subject to change without prior notice. If any doubt about safety for your application, please contact us immediately for technical assistance before purchase.

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LONG LIFE WITH EXTRA LOWER IMPEDANCE

長壽命極低阻抗品

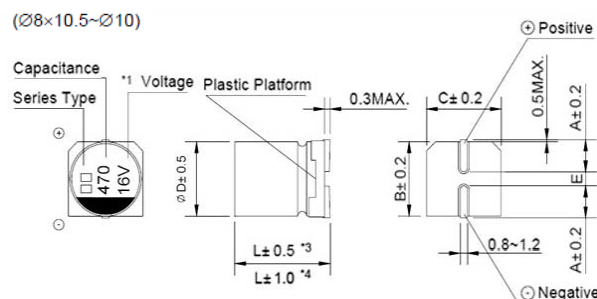
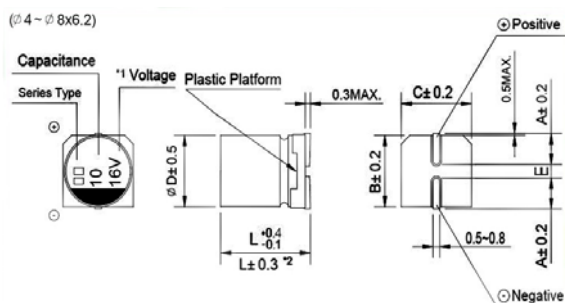
- Extra low impedance with temperature range -55 ~ +105°C
極低阻抗和適用於 -55 ~ +105°C 的溫度範圍
- Load life of 2000~5000 hours
負荷壽命 2000~5000 小時
- Miniature (size small than FZ series)
縮體型 (尺寸比 FZ 系列小)
- Comply with the RoHS directive
符合 RoHS 指令



□ SPECIFICATIONS 特性表

Items 項目	Characteristics 主要特性							
Operation Temperature Range 使用溫度範圍	-55 ~ +105°C							
Voltage Range 額定工作電壓範圍	6.3 ~ 50V							
Capacitance Range 靜電容量範圍	10 ~2200μF							
Capacitance Tolerance 靜電容量允許偏差	±20% at 120Hz, 20°C							
Leakage Current 漏電流	Leakage current ≒0.01CV or 3μA, whichever is greater (after 2 minutes application of rated voltage) 漏電流≒0.01CV 或 3μA，取較大值（施加額定工作電壓 2 分鐘後）							
Dissipation Factor (tan δ) 損耗角正切	Measurement frequency 測試頻率: 120Hz, Temperature 溫度: 20°C							
	Rated Voltage (V) 額定工作電壓	6.3	10	16	25	35	50	
	tan δ (max.) 最大損耗角正切	0.26	0.19	0.16	0.14	0.12	0.10	
Stability at Low Temperature 低溫特性	Measurement frequency 測試頻率: 120Hz							
	Rated Voltage (V) 額定工作電壓		63~16		25~50			
	Impedance Ratio 阻抗比 ZT/Z20 (max.)	Z(-25°C) / Z(20°C)		2		2		
		Z(-40°C) / Z(20°C)		3		3		
		Z(-55°C) / Z(20°C)		4		3		
Load Life 高溫負荷特性	After 5000 hrs. (2000 hrs. for Ø4~Ø6.3×5.8) application of the rated voltage at 105°C, they meet the characteristics listed below. 在 105°C 環境中施加額定工作電壓 5000 小時（Ø4~Ø6.3×5.8）後，電容器的特性符合下表的要求。							
	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 高溫貯存特性	After leaving capacitors under no load at 105°C for 1000 hours, they meet the specified value for load life characteristics listed above. 在 105°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。							
Resistance to Soldering Heat 耐焊接熱特性	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。							
	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 標示	Black print on the case top. 鋁殼頂部黑字印刷。							

□ DRAWING (Unit: mm) 外形圖



- *1. Voltage mark for 6.3V is [6V] 6.3V 的產品標識為 [6V]
 *2. Applicable to Ø6.3x7.7 適用於 Ø6.3x7.7
 *3. Applicable to Ø8x10.5~Ø10 適用於 Ø8x10.5~Ø10

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□ DIMENSIONS (Unit: mm) 尺寸表

ØD x L	4 x 5.8	5 x 5.8	6.3 x 5.8	6.3 x 7.7	8 x 6.2	8 x 10.5	10 x 10.5
A	2.0	2.2	2.6	2.6	3.3	3.0	3.2
B	4.3	5.3	6.6	6.6	8.3	8.3	10.3
C	4.3	5.3	6.6	6.6	8.3	8.3	10.3
E ± 0.2	1.0	1.4	2.2	2.1	2.2	3.1	4.6
L	5.8	5.8	5.8	7.7	6.2	10.5	10.5

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

µF	WV Code 代碼	6.3			10			16		
		0J			1A			1C		
47	470							4 x 5.8	0.85	160
68	680				4 x 5.8	0.85	160	5 x 5.8	0.36	240
100	101	4 x 5.8	0.85	160				5 x 5.8	0.36	240
150	151				5 x 5.8	0.36	240	6.3 x 5.8	0.26	300
220	221	5 x 5.8	0.36	240	6.3 x 5.8	0.26	300	6.3 x 5.8	0.26	300
330	331	6.3 x 5.8	0.26	300	6.3 x 7.7	0.16	600	6.3 x 7.7	0.16	600
470	471	6.3 x 7.7	0.16	600	6.3 x 7.7	0.16	600			
680	681	6.3 x 7.7	0.16	600				8 x 10.5	0.08	850
820	821							8 x 10.5	0.08	850
1000	102				8 x 10.5	0.08	850	10 x 10.5	0.06	1190
1200	122							10 x 10.5	0.06	1190
1500	152	8 x 10.5	0.08	850	10 x 10.5	0.60	1190	Case size ØD x L (mm) 尺寸	Impedance 阻抗值	Ripple current 紋波電流
2200	222	10 x 10.5	0.06	1190						

µF	WV Code 代碼	25			35			50		
		1E			1V			1H		
10	100							5 x 5.8 (4 x 5.8)	0.88 (2.30)	165 (85)
22	220	4 x 5.8	0.85	160	4 x 5.8	0.85	160	5 x 5.8	0.88	165
33	330	4 x 5.8	0.85	160	5 x 5.8	0.36	240			
47	470	5 x 5.8	0.36	240	5 x 5.8	0.36	240	6.3 x 5.8	0.68	195
68	680	5 x 5.8	0.36	240	6.3 x 5.8	0.26	300			
100	101	6.3 x 5.8	0.26	300	6.3 x 5.8	0.26	300	6.3 x 7.7	0.34	350
150	151	6.3 x 7.7	0.16	600	6.3 x 7.7	0.16	600			
220	221	6.3 x 7.7	0.16	600				8 x 10.5	0.18	670
330	331	6.3 x 7.7	0.16	600	8 x 10.5	0.08	850	10 x 10.5	0.12	900
390	391				8 x 10.5	0.08	850			
470	471	8 x 10.5	0.08	850						
560	561	8 x 10.5	0.08	850	10 x 10.5	0.06	1190			
680	681				10 x 10.5	0.06	1190			
820	821	10 x 10.5	0.06	1190				Case size ØD x L (mm) 尺寸	Impedance 阻抗值	Ripple current 紋波電流
1000	102	10 x 10.5	0.06	1190						

• Case size 尺寸 ØD x L (mm), impedance 阻抗值 (Ω) at 20°C 100KHz, ripple current 紋波電流 (mA rms) at 105°C 100KHz

□ FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT 紋波電流頻率補償係數

Frequency 頻率		50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 係數	10~ 68µF	0.35	0.50	0.64	0.83	1.00
	100 ~ 2200µF	0.40	0.55	0.70	0.85	1.00

- Taping specifications are given in page 10. 編帶標準請參閱第 10 頁。
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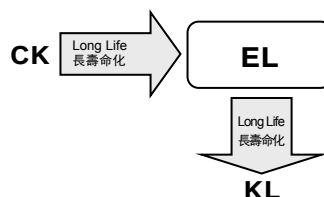
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LONG LIFE ASSURANCE

寬溫長壽命品

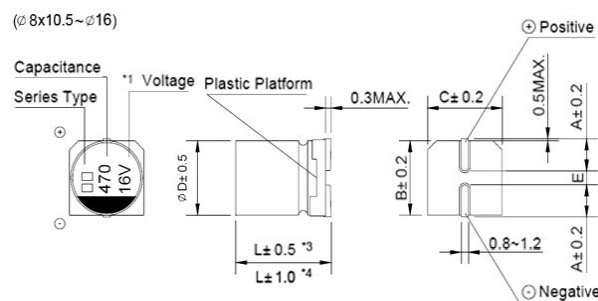
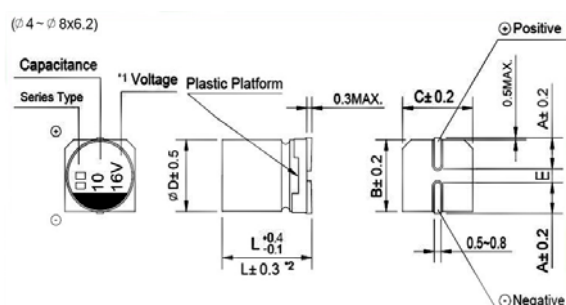
- Wide temperature range -55 ~ +105°C
適用於 -55 ~ +105°C 的寬溫範圍
- Load life of 2000~3000 hours
負荷壽命 2000~3000 小時
- Comply with the RoHS directive
符合 RoHS 指令



□ SPECIFICATIONS 特性表

Items 項目	Characteristics 主要特性																																													
Operation Temperature Range 使用溫度範圍	-55 ~ +105°C																																													
Voltage Range 額定工作電壓範圍	6.3 ~ 50V																																													
Capacitance Range 靜電容量範圍	0.1 ~ 3300μF																																													
Capacitance Tolerance 靜電容量允許偏差	±20% at 120Hz, 20°C																																													
Leakage Current 漏電流	Leakage current (Ø4~Ø10) ≦ 0.01CV or 3μA, whichever is greater (after 2 minutes application of rated voltage) Leakage current (Ø12.5~Ø16) ≦ 0.03CV or 4μA, whichever is greater (after 1 minute application of rated voltage) 漏電流 (Ø4~Ø10) ≦ 0.01CV 或 3μA, 取較大值 (施加額定工作電壓 2 分鐘後) 漏電流 (Ø12.5~Ø16) ≦ 0.03CV 或 4μA, 取較大值 (施加額定工作電壓 1 分鐘後)																																													
Dissipation Factor (tan δ) 損耗角正切	Measurement frequency 測試頻率: 120Hz, Temperature 溫度: 20°C <table><tr><td colspan="2">Rated Voltage (V) 額定工作電壓</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td colspan="2">tan δ (max.)</td><td>Ø4~Ø10</td><td>0.28</td><td>0.24</td><td>0.20</td><td>0.16</td><td>0.13</td><td>0.12</td></tr><tr><td colspan="2">最大損耗角正切</td><td>Ø12.5~Ø16</td><td>0.38</td><td>0.34</td><td>0.30</td><td>0.26</td><td>0.22</td><td>0.18</td></tr></table>							Rated Voltage (V) 額定工作電壓		6.3	10	16	25	35	50	tan δ (max.)		Ø4~Ø10	0.28	0.24	0.20	0.16	0.13	0.12	最大損耗角正切		Ø12.5~Ø16	0.38	0.34	0.30	0.26	0.22	0.18													
Rated Voltage (V) 額定工作電壓		6.3	10	16	25	35	50																																							
tan δ (max.)		Ø4~Ø10	0.28	0.24	0.20	0.16	0.13	0.12																																						
最大損耗角正切		Ø12.5~Ø16	0.38	0.34	0.30	0.26	0.22	0.18																																						
Stability at Low Temperature 低溫特性	Measurement frequency 測試頻率: 120Hz <table><tr><td colspan="2">Rated Voltage (V) 額定工作電壓</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td rowspan="4">Impedance Ratio 阻抗比 ZT/Z20 (max.)</td><td rowspan="2">Ø4~Ø10</td><td>Z(-25°C) / Z(20°C)</td><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td></tr><tr><td>Z(-55°C) / Z(20°C)</td><td>8</td><td>5</td><td>4</td><td>3</td><td>3</td><td>3</td></tr><tr><td rowspan="2">Ø12.5~Ø16</td><td>Z(-25°C) / Z(20°C)</td><td>5</td><td>4</td><td>3</td><td>2</td><td>2</td><td>2</td></tr><tr><td>Z(-55°C) / Z(20°C)</td><td>12</td><td>10</td><td>8</td><td>5</td><td>4</td><td>3</td></tr></table>							Rated Voltage (V) 額定工作電壓		6.3	10	16	25	35	50	Impedance Ratio 阻抗比 ZT/Z20 (max.)	Ø4~Ø10	Z(-25°C) / Z(20°C)	3	3	2	2	2	2	Z(-55°C) / Z(20°C)	8	5	4	3	3	3	Ø12.5~Ø16	Z(-25°C) / Z(20°C)	5	4	3	2	2	2	Z(-55°C) / Z(20°C)	12	10	8	5	4	3
Rated Voltage (V) 額定工作電壓		6.3	10	16	25	35	50																																							
Impedance Ratio 阻抗比 ZT/Z20 (max.)	Ø4~Ø10	Z(-25°C) / Z(20°C)	3	3	2	2	2	2																																						
		Z(-55°C) / Z(20°C)	8	5	4	3	3	3																																						
	Ø12.5~Ø16	Z(-25°C) / Z(20°C)	5	4	3	2	2	2																																						
		Z(-55°C) / Z(20°C)	12	10	8	5	4	3																																						
Load Life 高溫負荷特性	After 3000 hrs. (2000 hrs. for Ø4~Ø6.3×5.4 Ø6.3×7.7&Ø8×6.2) application of the rated voltage at 105°C, they meet the characteristics listed below. 在 105°C 環境中施加額定工作電壓 3000 小時 (Ø4~Ø6.3×5.4 Ø6.3×7.7 和Ø8×6.2 為 2000 小時) 後，電容器的特性符合下表的要求。 <table><tr><td>Capacitance Change 靜電容量變化率</td><td>Within ±25% of initial value 初始值的±25%以內</td></tr><tr><td>Dissipation Factor 損耗角正切</td><td>200% or less of initial specified value 不大於規範值的 200%</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 ±25% of initial value 初始值的±25%以內	Dissipation Factor 損耗角正切	200% or less of initial specified value 不大於規範值的 200%	Leakage Current 漏電流	initial specified value or less 不大於規範值																																	
Capacitance Change 靜電容量變化率	Within ±25% of initial value 初始值的±25%以內																																													
Dissipation Factor 損耗角正切	200% or less of initial specified value 不大於規範值的 200%																																													
Leakage Current 漏電流	initial specified value or less 不大於規範值																																													
Shelf Life 高溫貯存特性	After leaving capacitors under no load at 105°C for 1000 hours, they meet the specified value for load life characteristics listed above. 在 105°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。																																													
Resistance to Soldering Heat 耐焊接熱特性	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><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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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 標示	Black print on the case top. 鋁殼頂部黑字印刷。																																													

□ DRAWING (Unit: mm) 外形圖



- *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~∅16 適用於 ∅12.5~∅16

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EL Series

□ DIMENSIONS (Unit: mm) 尺寸表

ØD x L	4 x 5.8	5 x 5.8	6.3 x 5.8	6.3 x 7.7	8 x 6.2	8 x 10.5	10 x 10.5	10 x 12.5	12.5 x 13.5	12.5 x 16	16 x 16.5
A	2.0	2.2	2.6	2.6	3.3	3.0	3.2	3.2	4.6	4.6	5.8
B	4.3	5.3	6.6	6.6	8.3	8.3	10.3	10.3	12.8	12.8	17.0
C	4.3	5.3	6.6	6.6	8.3	8.3	10.3	10.3	12.8	12.8	17.0
E ± 0.2	1.0	1.5	2.1	2.1	2.2	3.1	4.6	4.6	4.6	4.6	6.4
L	5.4	5.4	5.4	7.7	6.2	10.5	10.5	12.5	13.5	16.0	16.5

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

WV Code 代碼 µF		6.3		10		16		25		35		50	
		0J		1A		1C		1E		1V		1H	
0.1	0R1											4 x 5.8	1
0.22	R22											4 x 5.8	2
0.33	R33											4 x 5.8	3
0.47	R47											4 x 5.8	5
1	010											4 x 5.8	10
2.2	2R2											4 x 5.8	16
3.3	3R3											4 x 5.8	16
4.7	4R7							4 x 5.8	13	4 x 5.8	14	5 x 5.8	23
10	100					4 x 5.8	18	5 x 5.8	20	5 x 5.8	21	6.3 x 5.8	35
22	220	4 x 5.8	22	5 x 5.8	25	5 x 5.8	27	6.3 x 5.8	36	6.3 x 5.8	38	6.3 x 7.7 (8 x 6.2)	70 (70)
33	330	5 x 5.8	27	5 x 5.8	30	6.3 x 5.8	40	6.3 x 5.8	60	6.3 x 7.7 (8 x 6.2)	84 (84)	8 x 10.5	90
47	470	5 x 5.8	33	6.3 x 5.8	41	6.3 x 5.8	48	6.3 x 7.7 (8 x 6.2)	90 (91)	8 x 10.5	98	8 x 10.5	90
100	101	6.3 x 5.8	50	6.3 x 5.8 (8 x 6.2)	53 (110)	6.3 x 5.8	60	6.3 x 7.7 8 x 10.5	95 130	8 x 10.5	130	10 x 10.5	100
150	151	6.3 x 5.8	55	6.3 x 7.7	105	6.3 x 7.7	95	8 x 10.5	140	10 x 10.5	315	10 x 10.5	100
220	221	6.3 x 7.7	100	8 x 10.5	210	8 x 10.5	210	10 x 10.5	190	10 x 10.5	315	10 x 12.5 (10 x 10.5)	250 (100)
330	331	8 x 10.5	210	8 x 10.5	210	8 x 10.5	210	10 x 10.5	315	10 x 10.5	315	12.5 x 13.5	400
470	471	8 x 10.5	210	10 x 10.5	315	10 x 10.5	315	10 x 10.5	315	12.5 x 13.5 (10 x 12.5)	500 (360)	16 x 16.5 (12.5 x 16)	650 (500)
680	681	8 x 10.5	210	10 x 10.5	315	10 x 10.5	315	10 x 12.5	380	12.5 x 13.5	500		
1000	102	10 x 10.5	315	10 x 12.5 (10 x 10.5)	360 (315)	12.5 x 13.5 (10 x 12.5) (10 x 10.5)	450 (350) (315)	12.5 x 13.5	550	16 x 16.5 (12.5 x 16)	700 (550)		
1500	152	10 x 12.5 (10 x 10.5)	450 (315)	12.5 x 13.5	500	12.5 x 13.5	500	12.5 x 16	800				
2200	222	12.5 x 13.5	620	12.5 x 16 (12.5 x 13.5)	650 (600)	16 x 16.5	900	16 x 16.5	1000			Case size 尺寸	Ripple current 紋波電流
3300	332	12.5 x 16	750	16 x 16.5	950								

• Case size ØD x L (mm), ripple current (mA rms) at 105°C 120Hz • 尺寸 ØD x L (mm), 紋波電流 (mA rms) 於 105°C 120Hz

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

Frequency 頻率			50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系數	Ø4 ~ Ø10	0.1 ~ 100µF	0.70	1.00	1.17	1.36	1.50
		150 ~ 1500µF	0.85	1.00	1.08	1.20	1.30
	Ø12.5 ~ Ø16	~ 470µF	0.75	1.00	1.35	1.57	2.00
		680 ~ 3300µF	0.85	1.00	1.23	1.34	1.50

- Taping specifications are given in page 10. 編帶標準請參閱第 10 頁。
- Please refer to page 11 for the minimum package quantity. 最小包裝數量請參閱第 11 頁。

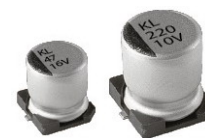
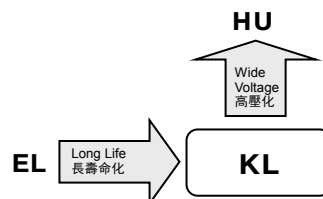
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5000 HOURS LONG LIFE ASSURANCE

5000 小時長壽命品

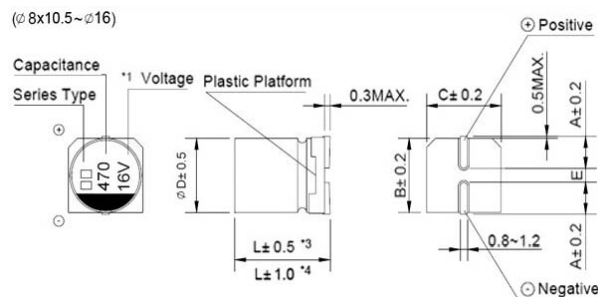
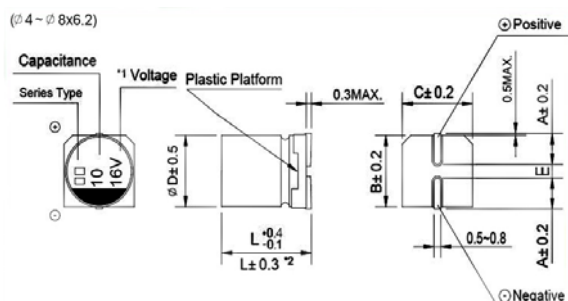
- Wide temperature range -55 ~ +105°C
適用於 -55 ~ +105°C 的寬溫範圍
- Load life of 3000~5000 hours
負荷壽命 3000~5000 小時
- Comply with the RoHS directive
符合 RoHS 指令



□ SPECIFICATIONS 特性表

Items 項目	Characteristics 主要特性																																										
Operation Temperature Range 使用溫度範圍	-55 ~ +105°C																																										
Voltage Range 額定工作電壓範圍	6.3 ~ 100V																																										
Capacitance Range 靜電容量範圍	0.1 ~ 3300μF																																										
Capacitance Tolerance 靜電容量允許偏差	±20% at 120Hz, 20°C																																										
Leakage Current 漏電流	Leakage current (Ø4~Ø10) ≦ 0.01CV or 3μA, whichever is greater (after 2 minutes application of rated voltage) Leakage current (Ø12.5~Ø16) ≦ 0.03CV or 4μA, whichever is greater (after 1 minute application of rated voltage) 漏電流 (Ø4~Ø10) ≦ 0.01CV 或 3μA, 取較大值 (施加額定工作電壓 2 分鐘後) 漏電流 (Ø12.5~Ø16) ≦ 0.03CV 或 4μA, 取較大值 (施加額定工作電壓 1 分鐘後)																																										
Dissipation Factor (tan δ) 損耗角正切	Measurement frequency 測試頻率: 120Hz, Temperature 溫度: 20°C <table><tr><td colspan="2">Rated Voltage (V) 額定工作電壓</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50~100</td></tr><tr><td>tan δ (max.)</td><td>Ø4~Ø10</td><td>0.28</td><td>0.24</td><td>0.20</td><td>0.16</td><td>0.13</td><td>0.12</td></tr><tr><td>最大損耗角正切</td><td>Ø12.5~Ø16</td><td>0.38</td><td>0.34</td><td>0.30</td><td>0.26</td><td>0.22</td><td>0.18</td></tr></table>							Rated Voltage (V) 額定工作電壓		6.3	10	16	25	35	50~100	tan δ (max.)	Ø4~Ø10	0.28	0.24	0.20	0.16	0.13	0.12	最大損耗角正切	Ø12.5~Ø16	0.38	0.34	0.30	0.26	0.22	0.18												
Rated Voltage (V) 額定工作電壓		6.3	10	16	25	35	50~100																																				
tan δ (max.)	Ø4~Ø10	0.28	0.24	0.20	0.16	0.13	0.12																																				
最大損耗角正切	Ø12.5~Ø16	0.38	0.34	0.30	0.26	0.22	0.18																																				
Stability at Low Temperature 低溫特性	Measurement frequency 測試頻率: 120Hz <table><tr><td colspan="2">Rated Voltage (V) 額定工作電壓</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50~100</td></tr><tr><td rowspan="4">Impedance Ratio 阻抗比 ZT/Z20 (max.)</td><td rowspan="2">Ø4~Ø10</td><td>Z(-25°C) / Z(20°C)</td><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td></tr><tr><td>Z(-55°C) / Z(20°C)</td><td>8</td><td>5</td><td>4</td><td>3</td><td>3</td></tr><tr><td rowspan="2">Ø12.5~Ø16</td><td>Z(-25°C) / Z(20°C)</td><td>5</td><td>4</td><td>3</td><td>2</td><td>2</td></tr><tr><td>Z(-55°C) / Z(20°C)</td><td>12</td><td>10</td><td>8</td><td>5</td><td>4</td><td>3</td></tr></table>							Rated Voltage (V) 額定工作電壓		6.3	10	16	25	35	50~100	Impedance Ratio 阻抗比 ZT/Z20 (max.)	Ø4~Ø10	Z(-25°C) / Z(20°C)	3	3	2	2	2	Z(-55°C) / Z(20°C)	8	5	4	3	3	Ø12.5~Ø16	Z(-25°C) / Z(20°C)	5	4	3	2	2	Z(-55°C) / Z(20°C)	12	10	8	5	4	3
Rated Voltage (V) 額定工作電壓		6.3	10	16	25	35	50~100																																				
Impedance Ratio 阻抗比 ZT/Z20 (max.)	Ø4~Ø10	Z(-25°C) / Z(20°C)	3	3	2	2	2																																				
		Z(-55°C) / Z(20°C)	8	5	4	3	3																																				
	Ø12.5~Ø16	Z(-25°C) / Z(20°C)	5	4	3	2	2																																				
		Z(-55°C) / Z(20°C)	12	10	8	5	4	3																																			
Load Life 高溫負荷特性	After 5000 hrs. (3000 hrs. for Ø4~Ø6.3×5.8 & Ø8×6.2) application of the rated voltage at 105°C, they meet the characteristics listed below. 在 105°C 環境中施加額定工作電壓 5000 小時 (Ø4~Ø6.3×5.8 和 Ø8×6.2 為 3000 小時) 後, 電容器的特性符合下表的要求。 <table><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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Leakage Current 漏電流	initial specified value or less 不大於規範值																																										
Shelf Life 高溫貯存特性	After leaving capacitors under no load at 105°C for 1000 hours, they meet the specified value for load life characteristics listed above. 在 105°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。																																										
Resistance to Soldering Heat 耐焊接熱特性	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><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 標示	Black print on the case top. 鋁殼頂部黑字印刷。																																										

□ DRAWING (Unit: mm) 外形圖



- *1. Voltage mark for 6.3V is [6V] 6.3V 的產品標識為 [6V]
 *2. Applicable to Ø6.3×7.7 適用於 Ø6.3×7.7
 *3. Applicable to Ø8×10.5~Ø10 適用於 Ø8×10.5~Ø10
 *4. Applicable to Ø12.5~Ø16 適用於 Ø12.5~Ø16

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KL Series

□ DIMENSIONS (Unit: mm) 尺寸表

∅D × L	4 × 5.8	5 × 5.8	6.3 × 5.8	6.3 × 7.7	8 × 6.2	8 × 10.5	10 × 10.5	10 × 12.5	12.5 × 13.5	12.5 × 16	16 × 16.5
A	2.0	2.2	2.6	2.6	3.3	3.0	3.2	3.2	4.6	4.6	5.8
B	4.3	5.3	6.6	6.6	8.3	8.3	10.3	10.3	12.8	12.8	17.0
C	4.3	5.3	6.6	6.6	8.3	8.3	10.3	10.3	12.8	12.8	17.0
E ± 0.2	1.0	1.5	2.1	2.1	2.2	3.1	4.6	4.6	4.6	4.6	6.4
L	5.4	5.4	5.4	7.7	6.2	10.5	10.5	12.5	13.5	16.0	16.5

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

WV Code 代碼	μF	6.3		10		16		25	
		0J		1A		1C		1E	
10	100					4 × 5.8	18	5 × 5.8	27
22	220	4 × 5.8	22	5 × 5.8	30	5 × 5.8	30	6.3 × 5.8	44
33	330	5 × 5.8	35	5 × 5.8	36	6.3 × 5.8	48	6.3 × 5.8	50
47	470	5 × 5.8	38	6.3 × 5.8	50	6.3 × 5.8	50	6.3 × 7.7 (8 × 6.2)	63 (63)
100	101	6.3 × 5.8	69	6.3 × 7.7 (8 × 6.2)	81 (81)	6.3 × 7.7 (8 × 6.2)	81 (81)	8 × 10.5	116
150	151	6.3 × 7.7 (8 × 6.2)	85 (85)	8 × 10.5	125	8 × 10.5	125	10 × 10.5	320
220	221	6.3 × 7.7 (8 × 6.2)	120 (120)	6.3 × 7.7 (8 × 10.5)	120 (141)	8 × 10.5 (10 × 10.5)	155 (216)	10 × 10.5 (8 × 10.5)	320 (180)
330	331	8 × 10.5	290	10 × 10.5	290	10 × 10.5	290	10 × 10.5	320
470	471	10 × 10.5	320	10 × 10.5	320	10 × 10.5	320	12.5 × 13.5 (10 × 12.5)	400 (350)
680	681	10 × 10.5	320	10 × 10.5	320	10 × 12.5	420	12.5 × 13.5	415
1000	102	10 × 10.5	410	10 × 12.5	390	12.5 × 13.5	550	12.5 × 13.5	460
1500	152	10 × 12.5	450	12.5 × 13.5	480	12.5 × 13.5	650	12.5 × 16	700
2200	222	12.5 × 13.5	680	12.5 × 16 (12.5 × 13.5)	750 (510)	16 × 16.5	800		
3300	332	12.5 × 16 (12.5 × 13.5)	850 (800)	16 × 16.5	800			Case size 尺寸	Ripple current 紋波電流

WV Code 代碼	μF	35		50		63		100	
		1V		1H		1J		2A	
0.1	0R1			4 × 5.8	1.0				
0.22	R22			4 × 5.8	2.6				
0.33	R33			4 × 5.8	3.2				
0.47	R47			4 × 5.8	5				
1	010			4 × 5.8	8				
2.2	2R2			4 × 5.8	12				
3.3	3R3			4 × 5.8	17			6.3 × 7.7 (8 × 6.2)	30 (30)
4.7	4R7	4 × 5.8	16	5 × 5.8	22			8 × 10.5	50
10	100	5 × 5.8	27	6.3 × 5.8	32	6.3 × 7.7 (8 × 6.2)	45 (45)	8 × 10.5	55
22	220	6.3 × 5.8	44	6.3 × 7.7 (8 × 6.2)	58 (58)	8 × 10.5	65	10 × 10.5	70
33	330	6.3 × 7.7 (8 × 6.2)	57 (57)	8 × 10.5	140	10 × 10.5	80	10 × 10.5	80
47	470	8 × 10.5	92	10 × 10.5	250	10 × 10.5	90	12.5 × 13.5 (10 × 12.5)	250 (150)
100	101	10 × 10.5	151	10 × 10.5	310	10 × 12.5	150	12.5 × 13.5	300
150	151	10 × 10.5	290	10 × 10.5	310			16 × 16.5 (12.5 × 16) (12.5 × 13.5)	600 (420) (380)
220	221	10 × 10.5	375	12.5 × 13.5 (10 × 12.5)	340 (320)	12.5 × 13.5	470		
330	331	12.5 × 13.5 (10 × 12.5)	380 (375)	12.5 × 16 (12.5 × 13.5)	600 (500)	16 × 16.5 (12.5 × 16)	650 (550)		
470	471	12.5 × 13.5	520	16 × 16.5	700				
680	681	12.5 × 13.5	550						
1000	102	16 × 16.5 (12.5 × 16)	750 (600)					Case size 尺寸	Ripple current 紋波電流

• Case size ∅D×L(mm), ripple current (mA rms) at 105°C 120Hz • 尺寸∅D×L(mm), 紋波電流(mA rms)於 105°C 120Hz

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

Frequency 頻率			50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系數	Ø4 ~ Ø10		0.70	1.00	1.17	1.36	1.50
	Ø12.5 ~ Ø16	~ 68µF	0.75	1.00	1.35	1.57	2.00
		100 ~ 470µF	0.80	1.00	1.23	1.34	1.50
		680 ~ 3300µF	0.85	1.00	1.10	1.13	1.15

- Taping specifications are given in page 10. 編帶標準請參閱第 10 頁。
- Please refer to page 11 for the minimum package quantity. 最小包裝數量請參閱第 11 頁。

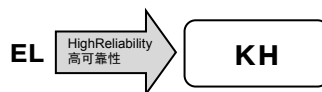
NOTE: All designs and specifications are for reference only and are subject to change without prior notice. If any doubt about safety for your application, please contact us immediately for technical assistance before purchase.

注：以上所提供的設計及特性參數僅供參考，任何修改不作預先通知。如果在使用上有疑問，請在採購前與我們聯繫，以便提供技術上的協助。

HIGH RELIABILITY

高可靠品

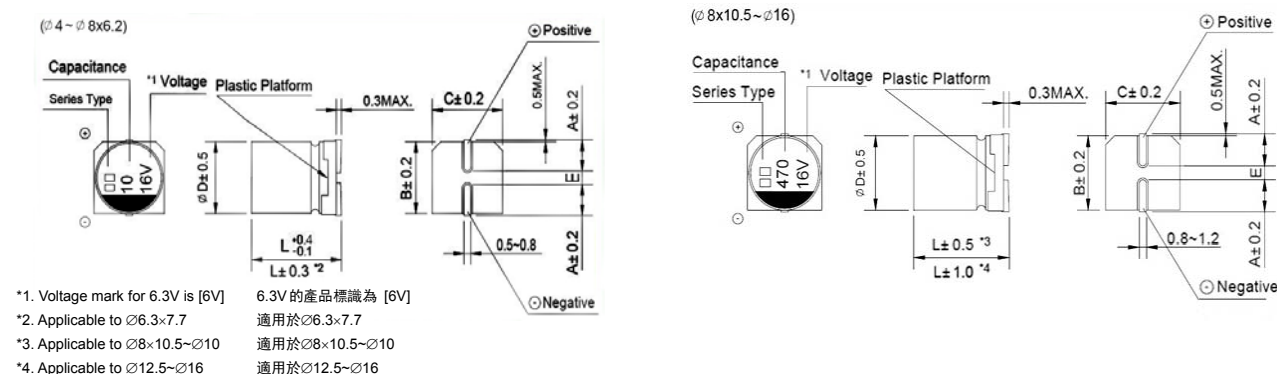
- High temperature range up to +125°C
適用於+125°C 的高溫範圍
- Suitable for automotive equipment
適用於汽車電子裝備
- Load life of 1000~5000 hours
負荷壽命 1000~5000 小時
- Comply with the RoHS directive
符合 RoHS 指令



□ SPECIFICATIONS 特性表

Items 項目	Characteristics 主要特性																																																	
Operation Temperature Range 使用溫度範圍	-55 ~ +125°C																																																	
Voltage Range 額定工作電壓範圍	10 ~ 450V																																																	
Capacitance Range 靜電容量範圍	3.3 ~2200μF																																																	
Capacitance Tolerance 靜電容量允許偏差	±20% at 120Hz, 20°C																																																	
Leakage Current 漏電流	Leakage current (10V~100V) ≤0.03CV or 4μA, whichever is greater (after 2 minutes application of rated voltage) Leakage current (160V~450V) ≤0.04CV +100μA, whichever is greater (after 2 minute application of rated voltage) 漏電流（10V~100V）≤0.03CV 或 4 μ A，取較大值（施加額定工作電壓 2 分鐘後） 漏電流（160V~450V）≤0.04CV+100 μ A，取較大值（施加額定工作電壓 2 分鐘後）																																																	
Dissipation Factor (tan δ) 損耗角正切	Measurement frequency 測試頻率: 120Hz, Temperature 溫度: 20°C <table><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</td><td>50</td><td>63</td><td>100</td><td>160~250</td><td>400, 450</td></tr><tr><td colspan="2">tan δ (max.) 最大損耗角正切</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>0.20</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		0.24	0.20	0.16	0.14	0.14	0.18	0.18	0.20	0.20																		
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		0.24	0.20	0.16	0.14	0.14	0.18	0.18	0.20	0.20																																								
Stability at Low Temperature 低溫特性	Measurement frequency 測試頻率: 120Hz <table><tr><td colspan="3">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="4">Impedance Ratio 阻抗比 ZT/Z20 (max.)</td><td rowspan="2">Ø4~Ø10</td><td>Z(-25°C) / Z(20°C)</td><td>4</td><td>3</td><td>2</td><td>2</td><td>-</td><td>-</td></tr><tr><td>Z(-55°C) / Z(20°C)</td><td>10</td><td>8</td><td>6</td><td>4</td><td>-</td><td>-</td></tr><tr><td rowspan="2">Ø12.5~Ø16</td><td>Z(-25°C) / Z(20°C)</td><td>4</td><td>3</td><td>2</td><td>2</td><td>3</td><td>6</td></tr><tr><td>Z(-55°C) / Z(20°C)</td><td>8</td><td>6</td><td>4</td><td>3</td><td>6</td><td>10</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.)	Ø4~Ø10	Z(-25°C) / Z(20°C)	4	3	2	2	-	-	Z(-55°C) / Z(20°C)	10	8	6	4	-	-	Ø12.5~Ø16	Z(-25°C) / Z(20°C)	4	3	2	2	3	6	Z(-55°C) / Z(20°C)	8	6	4	3	6	10
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.)	Ø4~Ø10	Z(-25°C) / Z(20°C)	4	3	2	2	-	-																																										
		Z(-55°C) / Z(20°C)	10	8	6	4	-	-																																										
	Ø12.5~Ø16	Z(-25°C) / Z(20°C)	4	3	2	2	3	6																																										
		Z(-55°C) / Z(20°C)	8	6	4	3	6	10																																										
Load Life 高溫負荷特性	After 5000 hrs. application of the rated voltage forØ12.5~16 (10~100V), and 2000 hrs.forØ8X10.5~Ø10 (10~100V), and 1000 hrs.for Ø6.3, as well as 2000 hrs. application of rated voltage forØ12.5~16 (160~450V) at 125°C, they meet the characteristics listed below. 在 125°C 環境中施加額定工作電壓 5000 小時於Ø12.5~16（10~100V），2000 小時於Ø8X10.5~Ø10（10~100V），1000 小時於Ø6.3，以及施加額定工作電壓 2000 小時於Ø12.5~16（160~450V）電容器的特性符合下表的要求。 <table><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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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。																																																	
Resistance to Soldering Heat 耐焊接熱特性	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><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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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 標示	Black print on the case top. 鋁殼頂部黑字印刷。																																																	

□ DRAWING (Unit: mm) 外形圖



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□ DIMENSIONS (Unit: mm) 尺寸表

ØD x L	4x5.8	5x5.8	6.3x5.8	6.3x7.7	8x10.5	10x10.5	10x12.5	12.5x13.5	12.5x16	16x16.5
A	2.0	2.2	2.6	2.6	3.0	3.2	3.2	4.6	4.6	5.8
B	4.3	5.3	6.6	6.6	8.4	10.4	10.4	12.8	12.8	17.0
C	4.3	5.3	6.6	6.6	8.4	10.4	10.4	12.8	12.8	17.0
E ± 0.2	1.0	1.5	2.1	2.1	3.1	4.6	4.6	4.6	4.6	6.4
L	5.8	5.8	5.8	7.7	10.5	10.5	12.5	13.5	16.0	16.5

□ 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)			
µF		Case size ØDxL (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 ØDxL (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 ØDxL (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									6.3x5.8	3.3	66	45
47	470					6.3x5.8	3.3	66	43	6.3x7.7	2.3	46	68
100	101	6.3x7.7	2.3	46	72	8x10.5	1.0	20	115	8x10.5	1.0	20	126
220	221	8x10.5	1.0	20	136	10x10.5	0.7	13.4	175	10x10.5	0.7	13.4	211
330	331	10x10.5	0.7	13.4	188	10x12.5	0.5	9.5	280	12.5x13.5 (10x12.5)	0.14 (0.5)	2.1 (9.5)	750 (270)
470	471	10x12.5	0.5	9.5	300	12.5x13.5	0.14	2.1	750	12.5x13.5	0.14	2.1	750
680	681					16x16.5 (12.5x13.5)	0.10 (0.14)	1.5 (2.1)	1000 (750)	16x16.5	0.10	1.5	1000
1000	102	12.5x16 (12.5x13.5)	0.11 (0.14)	1.5 (2.1)	900 (750)								
2200	222	16x16.5	0.10	1.5	1000								

WV Parameter 參數		35 (1V)				50 (1H)			
µF		Case size ØDxL (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 ØDxL (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	6.3x5.8	3.3	66	38	6.3x7.7 (6.3x5.8)	2.3 (3.3)	46 (66)	50 (38)
22	220	6.3x5.8	3.3	66	39	6.3x7.7	2.3	46	50
33	330	6.3x7.7	2.3	46	62	8x10.5	1.0	20	83
47	470	8x10.5	1.0	20	92	10x10.5	0.7	13.4	111
68	680	8x10.5	1.0	20	92				
100	101	10x10.5	0.7	13.4	151	12.5x13.5	0.23	3.5	550
220	221	12.5x13.5 (10x12.5)	0.14 (0.5)	2.1 (9.5)	750 (260)	16x16.5 (12.5x13.5)	0.15 (0.23)	2.3 (3.5)	800 (550)
330	331	12.5x13.5	0.14	2.1	750	16x16.5 (12.5x16)	0.15 (0.18)	2.3 (2.7)	850 (700)
470	471	16x16.5 (12.5x16)	0.10 (0.11)	1.5 (1.5)	1000 (900)				

WV Parameter 參數		63 (1J)				100 (2A)			
µF		Case size ØDxL (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 ØDxL (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	6.3x7.7	2.3	115	42	8x10.5	1.00	50	53
22	220	8x10.5	1.0	50	56	10x10.5	0.70	35	63
33	330	8x10.5 10x10.5	1.0 0.7	50 35	65 77	10x12.5	0.45	22.5	130
47	470	8x10.5 10x12.5	1.0 0.45	50 22.5	100 150	12.5x13.5	0.33	16.5	450
68	680					12.5x16	0.26	13	550
100	101	12.5x13.5	0.25	12.5	500	16x16.5	0.24	12	650
220	221	12.5x16	0.20	10	600				
330	331	16x16.5	0.18	9	820				

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

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 $\varnothing D \times L$ (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~	10KHz~
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 ~ 2200μF	0.40	0.60	0.85	0.95	1.00

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

- Taping specifications are given in page 10 "Taping Specifications". 編帶標準請參閱第 10 頁“編帶標準”。
- Please refer to page 11 "Package Quantity" for the minimum package quantity. 最小包裝數量請參閱第 11 頁“包裝數量”。

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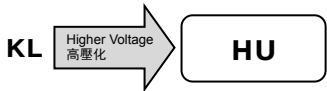
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HU Series

HIGH VOLTAGE, LONG LIFE

高壓長壽命品

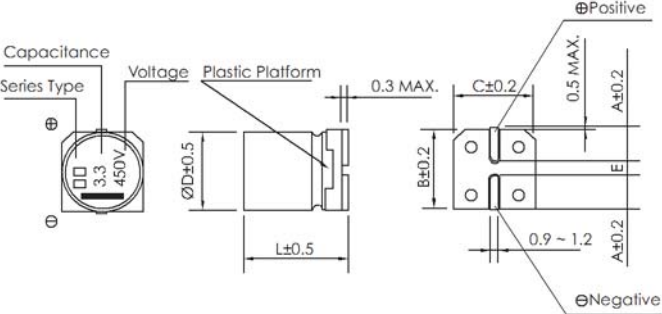
- Operating with wide temperature range -40~+105°C
適用於 -40~+105°C 的寬溫範圍
- Load life of 5000 hours
負荷壽命 5000 小時
- Comply with the RoHS directive
符合 RoHS 指令



□ SPECIFICATIONS 特性表

Items 項目	Characteristics 主要特性		
Operation Temperature Range 使用溫度範圍	-40 ~ +105°C		
Voltage Range 額定工作電壓範圍	160 ~ 450V		
Capacitance Range 靜電容量範圍	1~ 47μF		
Capacitance Tolerance 靜電容量允許偏差	±20% at 120Hz, 20°C		
Leakage Current 漏電流	Leakage current ≤0.04CV + 100μA, whichever is greater (after 2 minutes application of rated voltage) 漏電流 ≤0.04CV + 100μA，取較大值（施加額定工作電壓 2 分鐘後）		
Dissipation Factor (tan δ) 損耗角正切	Measurement frequency 測試頻率: 120Hz, Temperature 溫度: 20°C		
	Rated Voltage (V) 額定工作電壓	160 ~ 250	400, 500
	tan δ (max.) 最大損耗角正切	0.15	0.20
Stability at Low Temperature 低溫特性	Measurement frequency 測試頻率: 120Hz		
	Rated Voltage (V) 額定工作電壓	160 ~ 250	400, 500
	Impedance Ratio 阻抗比	Z (-25°C) / Z (20°C)	3
	ZT/Z20 (max.)	Z (-40°C) / Z (20°C)	6
Load Life 高溫負荷特性	After 5000 hours (< Ø8, 3000 hours) application of the rated voltage at 105°C, they meet the characteristics listed below. 在 105°C 環境中施加額定工作電壓 5000 小時 (< Ø8 產品, 3000 時) 後，電容器的特性符合下表的要求。		
	Capacitance Change 靜電容量變化率	Within ±20% of initial value 初始值的±20%以內	
	Dissipation Factor 損耗角正切	200% or less of initial specified value 不大於規範值的 200%	
	Leakage Current 漏電流	initial specified value or less 不大於規範值	
Shelf Life 高溫貯存特性	After leaving capacitors under no load at 105°C for 1000 hours, they meet the specified value for load life characteristics listed above. 在 105°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。		
	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。		
Resistance to Soldering Heat 耐焊接熱特性	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 (Unit: mm) 外形圖



- A pressure relief vent is attached to products over ØD=8
ØD=8 以上產品有緩壓防爆閥

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注: 以上所提供的設計及特性參數僅供參考, 任何修改不作預先通知。如果在使用上有疑問, 請在採購前與我們聯繫, 以便提供技術上的協助。

HU Series

□ DIMENSIONS (Unit: mm) 尺寸表

ØD x L	6.3 x 10.5	8 x 10.5	8 x 12.5	10 x 12.5	12.5 x 13.5	12.5 x 16
A	2.6	3.0	3.0	3.2	4.7	4.7
B	6.6	8.3	8.3	10.3	13.0	13.0
C	6.6	8.3	8.3	10.3	13.0	13.0
E ± 0.2	1.9	3.1	3.1	4.6	4.6	4.6
L	10.5	10.5	12.5	12.5	13.5	16.0

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

μF	WV Code 代碼	160		200		250		400		450	
		2C		2D		2E		2G		2W	
1	010					6.3 × 10.5	23				
2.2	2R2	6.3 × 10.5	20	6.3 × 10.5	23	6.3 × 10.5	30	6.3 × 10.5	30	10 × 12.5	40
3.3	3R3	6.3 × 10.5	23	6.3 × 10.5	30	8 × 10.5	35	8 × 10.5 8 × 12.5 10 × 12.5	35 38 (40)	10 × 12.5	40
4.7	4R7	6.3 × 10.5	30	8 × 10.5	35	8 × 12.5	40	8 × 12.5 10 × 10.5 (10 × 12.5)	40 45 (50)	10 × 12.5	50
5.6	5R6							8 × 12.5	45		
6.8	6R8	8 × 10.5	35	8 × 10.5	40	10 × 12.5	45	10 × 12.5 (10 × 12.5)	50 (45)	12.5 × 13.5	65
8.2	8R2							10 × 12.5	75		
10	100	10 × 12.5	45	10 × 12.5	80	8 × 12.5 10 × 12.5	95 105	12.5 × 13.5 10 × 12.5	85 65	12.5 × 13.5	85
22	220	12.5 × 13.5	85	12.5 × 13.5	110	12.5 × 16	180				
33	330	12.5 × 13.5	95	12.5 × 16	220					Case size 尺寸	Ripple current 紋波電流
47	470	12.5 × 16	260								

• Case size ØD x L (mm), ripple current (mA rms) at 105°C, 120Hz • 尺寸 ØD x L (mm) · 紋波電流 (mA rms) 於 105°C, 120Hz

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

Frequency 頻率	50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 系數	0.80	1.00	1.25	1.40	1.60

- Taping specifications are given in page 10 "Taping Specifications". 編帶標準請參閱第 10 頁 "編帶標準"。
- Please refer to page 11 "Package Quantity" for the minimum package quantity. 最小包裝數量請參閱第 11 頁 "包裝數量"。

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