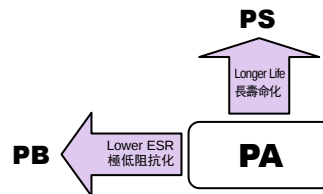


## PA Series

## RADIAL LEAD TYPE, STANDARD

## 插件式，標準品

- Operating with wide temperature range -55~+105°C  
適用於 -55~+105°C 的寬溫範圍
- Low ESR, high ripple current  
低阻抗，高紋波電流
- Load life of 2000 hours  
負荷壽命 2000 小時
- RoHS & REACH compliant, Halogen-free  
符合 RoHS 與 REACH，無鹵



## □ SPECIFICATIONS 特性表

| Items 項目                                                                                                     | Characteristics 主要特性                                                                                                                                                                                                     |                                                      |                |
|--------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----------------|
| Operation Temperature Range 使用溫度範圍                                                                           | -55 ~ +105°C                                                                                                                                                                                                             |                                                      |                |
| Voltage Range 額定工作電壓範圍                                                                                       | 2.5 ~ 25V                                                                                                                                                                                                                |                                                      |                |
| Capacitance Range 靜電容量範圍                                                                                     | 6.8 ~ 1500μF                                                                                                                                                                                                             |                                                      |                |
| Capacitance Tolerance 靜電容量允許偏差                                                                               | ±20% at 120Hz, 20°C                                                                                                                                                                                                      |                                                      |                |
| Leakage Current 漏電流 (*1)                                                                                     | ≤Specified value (after 2 minutes application of rated voltage at 20°C). ≤規範值（在 20°C 環境中施加額定工作電壓 2 分鐘後）。                                                                                                                 |                                                      |                |
| Dissipation Factor (tan δ) 損耗角正切                                                                             | ≤Specified value at 120Hz, 20°C. ≤規範值（在 20°C 120Hz 環境下）。                                                                                                                                                                 |                                                      |                |
| ESR 阻抗值 (*2)                                                                                                 | ≤Specified value at 100KHz, 20°C. ≤規範值（在 20°C 100KHz 環境下）。                                                                                                                                                               |                                                      |                |
| Stability at Low Temperature 低溫特性                                                                            | Measurement frequency 測試頻率: 100KHz                                                                                                                                                                                       |                                                      |                |
|                                                                                                              | Impedance Ratio 阻抗比<br>ZT/Z20 (max.)                                                                                                                                                                                     | Z(+105°C)/Z(20°C)<br>Z(-55°C)/Z(20°C)                | ≤1.25<br>≤1.25 |
| Damp Heat (Steady State) 穩態濕熱                                                                                | When the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours at 60°C, 90% RH, they meet the characteristics listed below.<br>在 60°C 和相對濕度 90%環境下施加額定工作電壓 1000 小時並冷卻至 20°C 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 為初始值的±20%以內 (*3)        |                |
|                                                                                                              | Dissipation Factor 損耗角正切                                                                                                                                                                                                 | 150% or less of initial specified value 不大於規範值的 150% |                |
|                                                                                                              | ESR 阻抗值 (*2)                                                                                                                                                                                                             | 150% or less of initial specified value 不大於規範值的 150% |                |
|                                                                                                              | Leakage Current 漏電流                                                                                                                                                                                                      | Initial specified value or less 不大於規範值               |                |
|                                                                                                              |                                                                                                                                                                                                                          |                                                      |                |
| Endurance 耐久性                                                                                                | After 2000 hours application of the rated voltage at 105°C, they meet the characteristics listed below.<br>在 105°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 ±20% of initial value 為初始值的±20%以內 (*3)        |                |
|                                                                                                              | Dissipation Factor 損耗角正切                                                                                                                                                                                                 | 150% or less of initial specified value 不大於規範值的 150% |                |
|                                                                                                              | ESR 阻抗值 (*2)                                                                                                                                                                                                             | 150% or less of initial specified value 不大於規範值的 150% |                |
|                                                                                                              | 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<br><br>(Please refer page 9 for soldering conditions)<br>(焊接條件請查閱第 12 頁) | After reflow soldering and restored at room temperature, they meet the characteristics listed below.<br>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 (*3)         |                |
|                                                                                                              | Dissipation Factor 損耗角正切                                                                                                                                                                                                 | 130% or less of initial specified value 不大於規範值的 130% |                |
|                                                                                                              | ESR 阻抗值 (*2)                                                                                                                                                                                                             | 130% or less of initial specified value 不大於規範值的 130% |                |
|                                                                                                              | Leakage Current 漏電流                                                                                                                                                                                                      | Initial specified value or less 不大於規範值               |                |
|                                                                                                              |                                                                                                                                                                                                                          |                                                      |                |
| Marking 標識                                                                                                   | Red print on the case top. 鋁殼頂部紅色字體印刷。                                                                                                                                                                                   |                                                      |                |

(\*1) If any doubt arises, measure the leakage current after the voltage treatment of applying DC rated voltage continuously to the capacitor for 120 minutes at 105°C.

如未能確定，在 105°C 環境下連續施加額定工作電壓 120 分鐘後測量漏電流。

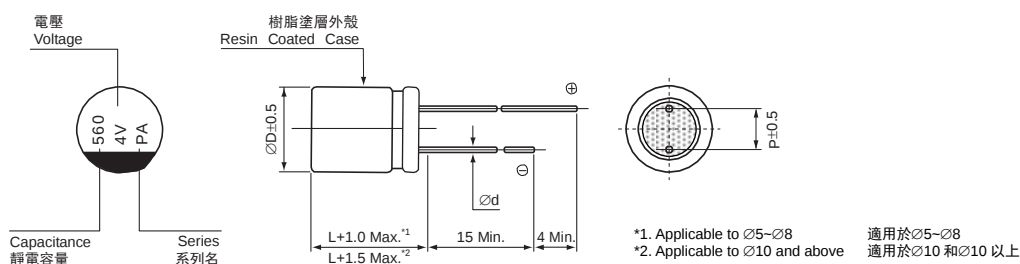
(\*2) Should be measured at both of the terminal ends closest to the capacitor body.

測試應為靠近兩個端子的末端。

(\*3) The value before test of examination of resistance to soldering.

焊接測試前的值。

## □ DRAWING 外形圖 (Unit: mm)



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

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CAT.2019/V1

## PA Series

## □ DIMENSIONS 尺寸表 (Unit: mm)

| ØD × L | 5 × 7/9/11   | 6.3 × 6/7 | 6.3 × 8/9 | 6.3 × 10.5/11/12 | 8 × 7/8/9   | 8 × 11/12 | 10 × 8/10/13  |
|--------|--------------|-----------|-----------|------------------|-------------|-----------|---------------|
| P      | 2.0          | 2.5       | 2.5       | 2.5              | 3.5         | 3.5       | 5.0           |
| Ød     | 0.5          | 0.6       | 0.6       | 0.6              | 0.6         | 0.6       | 0.6           |
| L      | 7.0/9.0/11.0 | 6.0/7.0   | 8.0/9.0   | 10.5/11.0/12.0   | 7.0/8.0/9.0 | 11.0/12.0 | 8.0/10.0/13.0 |

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

| WV (V)       |              | 2.5 (0E)                     |                                           |                                   |                                         |                                                        | 4 (0G)                       |                                           |                                   |                                         |                                                        |
|--------------|--------------|------------------------------|-------------------------------------------|-----------------------------------|-----------------------------------------|--------------------------------------------------------|------------------------------|-------------------------------------------|-----------------------------------|-----------------------------------------|--------------------------------------------------------|
| Cap. 容量 (µF) | Parameter 參數 | Case size<br>ØD×L (mm)<br>尺寸 | Dissipation<br>factor<br>(tan δ)<br>損耗角正切 | Leakage<br>current<br>(µA)<br>漏電流 | ESR (mΩ)<br>max. 20°C,<br>100KHz<br>阻抗值 | Ripple current<br>(mA rms)<br>105°C,<br>100KHz<br>紋波電流 | Case size<br>ØD×L (mm)<br>尺寸 | Dissipation<br>factor<br>(tan δ)<br>損耗角正切 | Leakage<br>current<br>(µA)<br>漏電流 | ESR (mΩ)<br>max. 20°C,<br>100KHz<br>阻抗值 | Ripple current<br>(mA rms)<br>105°C,<br>100KHz<br>紋波電流 |
| 270          | 271          |                              |                                           |                                   |                                         |                                                        | 6.3 × 9<br>(6.3 × 10.5)      | 0.08<br>(0.08)                            | 216<br>(216)                      | 7<br>(20)                               | 5600<br>(3200)                                         |
| 330          | 331          | 6.3 × 9                      | 0.08                                      | 165                               | 7                                       | 5600                                                   |                              |                                           |                                   |                                         |                                                        |
| 390          | 391          | 6.3 × 10.5                   | 0.08                                      | 195                               | 20                                      | 3200                                                   | 6.3 × 10.5                   | 0.08                                      | 312                               | 24                                      | 3300                                                   |
| 560          | 561          | 6.3 × 9                      | 0.08                                      | 280                               | 7                                       | 5600                                                   | 8 × 9<br>(8 × 12)            | 0.08<br>(0.08)                            | 448<br>(448)                      | 7<br>(7)                                | 5200<br>(5500)                                         |
| 680          | 681          | 8 × 9                        | 0.08                                      | 340                               | 7                                       | 4800                                                   | 8 × 12                       | 0.08                                      | 544                               | 6                                       | 6200                                                   |
| 820          | 821          | 6.3 × 9                      | 0.08                                      | 410                               | 7                                       | 5600                                                   | 10 × 13                      | 0.08                                      | 656                               | 6                                       | 6500                                                   |
| 1000         | 102          | 10 × 13                      | 0.08                                      | 500                               | 6                                       | 6500                                                   | 10 × 13                      | 0.08                                      | 800                               | 6                                       | 6640                                                   |
| 1200         | 122          | 10 × 13                      | 0.08                                      | 600                               | 8                                       | 5300                                                   | 10 × 13                      | 0.08                                      | 960                               | 8                                       | 5600                                                   |
| 1500         | 152          | 8 × 12                       | 0.08                                      | 750                               | 7                                       | 6100                                                   |                              |                                           |                                   |                                         |                                                        |

| WV (V)       |              | 6.3 (0J)                     |                                           |                                   |                                         |                                                        | 10 (1A)                        |                                           |                                   |                                         |                                                        |
|--------------|--------------|------------------------------|-------------------------------------------|-----------------------------------|-----------------------------------------|--------------------------------------------------------|--------------------------------|-------------------------------------------|-----------------------------------|-----------------------------------------|--------------------------------------------------------|
| Cap. 容量 (µF) | Parameter 參數 | Case size<br>ØD×L (mm)<br>尺寸 | Dissipation<br>factor<br>(tan δ)<br>損耗角正切 | Leakage<br>current<br>(µA)<br>漏電流 | ESR (mΩ)<br>max. 20°C,<br>100KHz<br>阻抗值 | Ripple current<br>(mA rms)<br>105°C,<br>100KHz<br>紋波電流 | Case size<br>ØD×L (mm)<br>尺寸   | Dissipation<br>factor<br>(tan δ)<br>損耗角正切 | Leakage<br>current<br>(µA)<br>漏電流 | ESR (mΩ)<br>max. 20°C,<br>100KHz<br>阻抗值 | Ripple current<br>(mA rms)<br>105°C,<br>100KHz<br>紋波電流 |
| 47           | 470          |                              |                                           |                                   |                                         |                                                        | 6.3 × 10.5                     | 0.08                                      | 94                                | 25                                      | 2900                                                   |
| 68           | 680          |                              |                                           |                                   |                                         |                                                        | 6.3 × 10.5                     | 0.08                                      | 136                               | 25                                      | 2900                                                   |
| 100          | 101          |                              |                                           |                                   |                                         |                                                        | 6.3 × 8<br>(6.3 × 10.5)        | 0.08<br>(0.08)                            | 200<br>(200)                      | 25<br>(25)                              | 2900<br>(2900)                                         |
| 150          | 151          |                              |                                           |                                   |                                         |                                                        | 6.3 × 10.5                     | 0.08                                      | 300                               | 25                                      | 2900                                                   |
| 220          | 221          | 5 × 7<br>(6.3 × 10.5)        | 0.08<br>(0.08)                            | 277<br>(277)                      | 20<br>(20)                              | 3000<br>(3200)                                         | 6.3 × 7                        | 0.08                                      | 440                               | 12                                      | 3150                                                   |
| 270          | 271          |                              |                                           |                                   |                                         |                                                        | 8 × 12                         | 0.08                                      | 540                               | 8                                       | 4900                                                   |
| 330          | 331          | 6.3×10.5                     | 0.08                                      | 416                               | 24                                      | 3300                                                   |                                |                                           |                                   |                                         |                                                        |
| 470          | 471          | 8 × 9<br>(8 × 12)            | 0.08<br>(0.08)                            | 592<br>(592)                      | 7<br>(7)                                | 5200<br>(5500)                                         | 5 × 11<br>(8 × 8)<br>(10 × 13) | 0.08<br>(0.08)<br>(0.08)                  | 940<br>(940)<br>(940)             | 16<br>(12)<br>(7)                       | 3000<br>(5300)<br>(5700)                               |
| 560          | 561          |                              |                                           |                                   |                                         |                                                        | 10 × 13                        | 0.08                                      | 1120                              | 7                                       | 5900                                                   |
| 680          | 681          | 10 × 13                      | 0.08                                      | 857                               | 6                                       | 6300                                                   | 10 × 13                        | 0.08                                      | 1360                              | 7                                       | 6100                                                   |

| WV (V)       |              | 16 (1C)                            |                                           |                                   |                                         |                                                        | 20 (1D)                      |                                           |                                   |                                         |                                                        |
|--------------|--------------|------------------------------------|-------------------------------------------|-----------------------------------|-----------------------------------------|--------------------------------------------------------|------------------------------|-------------------------------------------|-----------------------------------|-----------------------------------------|--------------------------------------------------------|
| Cap. 容量 (µF) | Parameter 參數 | Case size<br>ØD×L (mm)<br>尺寸       | Dissipation<br>factor<br>(tan δ)<br>損耗角正切 | Leakage<br>current<br>(µA)<br>漏電流 | ESR (mΩ)<br>max. 20°C,<br>100KHz<br>阻抗值 | Ripple current<br>(mA rms)<br>105°C,<br>100KHz<br>紋波電流 | Case size<br>ØD×L (mm)<br>尺寸 | Dissipation<br>factor<br>(tan δ)<br>損耗角正切 | Leakage<br>current<br>(µA)<br>漏電流 | ESR (mΩ)<br>max. 20°C,<br>100KHz<br>阻抗值 | Ripple current<br>(mA rms)<br>105°C,<br>100KHz<br>紋波電流 |
| 22           | 220          |                                    |                                           |                                   |                                         |                                                        | 6.3 × 6                      | 0.12                                      | 88                                | 50                                      | 1700                                                   |
| 39           | 390          |                                    |                                           |                                   |                                         |                                                        | 8 × 7                        | 0.12                                      | 156                               | 45                                      | 2000                                                   |
| 47           | 470          |                                    |                                           |                                   |                                         |                                                        | 8 × 7                        | 0.12                                      | 188                               | 45                                      | 2000                                                   |
| 56           | 560          |                                    |                                           |                                   |                                         |                                                        | 10 × 8                       | 0.12                                      | 224                               | 40                                      | 2400                                                   |
| 68           | 680          |                                    |                                           |                                   |                                         |                                                        | 10 × 8                       | 0.12                                      | 272                               | 40                                      | 2600                                                   |
| 82           | 820          |                                    |                                           |                                   |                                         |                                                        | 10 × 8                       | 0.12                                      | 328                               | 40                                      | 2600                                                   |
| 100          | 101          | 5 × 8<br>(6.3 × 7)<br>(6.3 × 10.5) | 0.08<br>(0.08)<br>(0.08)                  | 320<br>(320)<br>(320)             | 25<br>(25)<br>(24)                      | 2350<br>(2600)<br>(2900)                               | 8 × 12                       | 0.12                                      | 400                               | 22                                      | 3320                                                   |
| 120          | 121          |                                    |                                           |                                   |                                         |                                                        | 10 × 10                      | 0.12                                      | 480                               | 35                                      | 2800                                                   |
| 150          | 151          |                                    |                                           |                                   |                                         |                                                        | 10 × 13                      | 0.12                                      | 600                               | 20                                      | 4320                                                   |
| 180          | 181          | 5 × 9<br>(8 × 8)<br>(8 × 12)       | 0.08<br>(0.08)<br>(0.08)                  | 576<br>(576)<br>(576)             | 12<br>(10)<br>(9)                       | 2750<br>(4200)<br>(5000)                               |                              |                                           |                                   |                                         |                                                        |
| 220          | 221          | 6.3 × 8<br>(6.3 × 12)              | 0.08<br>(0.08)                            | 704<br>(704)                      | 12<br>(12)                              | 3800<br>(4400)                                         |                              |                                           |                                   |                                         |                                                        |
| 270          | 271          | 8 × 8<br>(8 × 12)                  | 0.08<br>(0.08)                            | 864<br>(864)                      | 10<br>(9)                               | 4600<br>(5100)                                         |                              |                                           |                                   |                                         |                                                        |
| 330          | 331          | 10 × 13                            | 0.08                                      | 1056                              | 9                                       | 6100                                                   |                              |                                           |                                   |                                         |                                                        |
| 470          | 471          | 10 × 13                            | 0.08                                      | 1504                              | 9                                       | 6100                                                   |                              |                                           |                                   |                                         |                                                        |

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## PA Series

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

| WV (V)                   |                 | 25 (1E)                                                |                                                   |                                         |                                                  |                                                        |
|--------------------------|-----------------|--------------------------------------------------------|---------------------------------------------------|-----------------------------------------|--------------------------------------------------|--------------------------------------------------------|
| Cap.<br>容量<br>( $\mu$ F) | Parameter<br>參數 | Case size<br>$\varnothing D \times L$ (mm)<br>尺寸       | Dissipation<br>factor<br>(tan $\delta$ )<br>損耗角正切 | Leakage<br>current<br>( $\mu$ A)<br>漏電流 | ESR (m $\Omega$ )<br>max. 20°C,<br>100KHz<br>阻抗值 | Ripple current<br>(mA rms)<br>105°C,<br>100KHz<br>紋波電流 |
|                          |                 |                                                        |                                                   |                                         |                                                  |                                                        |
| 6.8                      | 6R8             | 6.3 $\times$ 6                                         | 0.12                                              | 34                                      | 80                                               | 1200                                                   |
| 10                       | 100             | 6.3 $\times$ 6                                         | 0.12                                              | 50                                      | 65                                               | 1500                                                   |
| 22                       | 220             | 8 $\times$ 7                                           | 0.12                                              | 110                                     | 60                                               | 1500                                                   |
| 33                       | 330             | 8 $\times$ 7                                           | 0.12                                              | 165                                     | 50                                               | 1800                                                   |
| 47                       | 470             | 6.3 $\times$ 7<br>(10 $\times$ 13)                     | 0.12<br>(0.12)                                    | 235<br>(235)                            | 49<br>(30)                                       | 1300<br>(3000)                                         |
| 56                       | 560             | 10 $\times$ 13                                         | 0.12                                              | 280                                     | 28                                               | 3800                                                   |
| 100                      | 101             | 5 $\times$ 11<br>(6.3 $\times$ 8)<br>(6.3 $\times$ 11) | 0.12<br>(0.12)<br>(0.12)                          | 500<br>(500)<br>(500)                   | 30<br>(30)<br>(30)                               | 2500<br>(2500)<br>(3000)                               |
| 220                      | 221             | 6.3 $\times$ 12<br>(8 $\times$ 11)                     | 0.12<br>(0.12)                                    | 1100<br>(1100)                          | 20<br>(18)                                       | 4000<br>(4300)                                         |

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