



FEATURES

- Up to 1,000,000 duty cycles or 10 year DC life*
- High power and energy
- 1200F to 3,400F capacitance range
- Threaded terminals or laser-weldable posts
- REACH,RoHS Directive Compliant

APPLICATIONS

- High shock and vibration environments
- Automotive subsystems ,Wind turbine pitch control
- Hybrid vehicles ,Rail
- Heavy industrial equipment
- UPS & telecom systems



GENERAL SPECIFICATIONS

| Item | Performance |
|---|--|
| Operating temperature | -40°C to +65°C |
| Capacitance range | 1200F to 3400F |
| Rated voltage | 2.7 V/ 2.85V / 3.0V |
| Surge voltage | 2.85 V/ 3.0V /3.15V |
| Temperature characteristics | Capacitance change: Within $\pm 20\%$ of initial measured value at +25°C Internal resistance: Within $\pm 200\%$ of initial measured value at +25°C |
| High temperature load time | After 65°C 1500 hours : Capacitance change: $\pm 20\%$ of initial rated value Internal resistance: Within 1 times of initial specified value |
| High temperature storage | After 65°C 1500 hours of storage Capacitance change: $\pm 20\%$ of initial rated value Internal resistance: Within 1 times of initial specified value |
| Projected cycle life (From rated voltage to 1/2 rated voltage at 25°C) | After 500,000 cycles: Capacitance change: Within $\pm 20\%$ of initial rated value Internal resistance: Within 1 times of initial specified value |
| Vibration resistance | Amplitude:1.5mm /Frequency:10~55Hz /Duration: X,Y,Z(2 hrs)/Duration of testing:6 hrs Capacitance change: Within $\pm 20\%$ of initial rated value Internal resistance: Within 2 times of initial specified value |
| Shelf life | After 4 years at 25°C without load, the capacitor shall meet the specified endurance limits. |

PART NUMBER SYSTEM

| <u>CNP</u> | <u>3000</u> | <u>P</u> | <u>270</u> | <u>K12</u> | <u>***</u> |
|------------|---------------|-------------|--------------------|------------|--------------|
| Series | Capacity Code | Cylindrical | Rated voltage(VDC) | Foot size | Special Code |

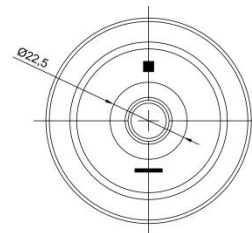
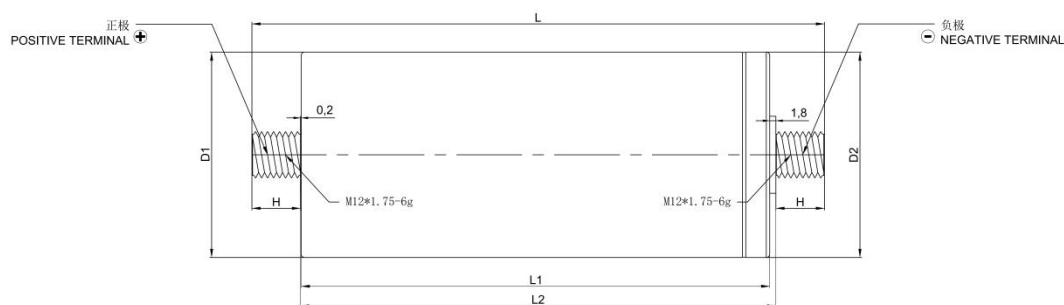
Casing Display:



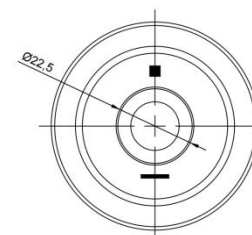
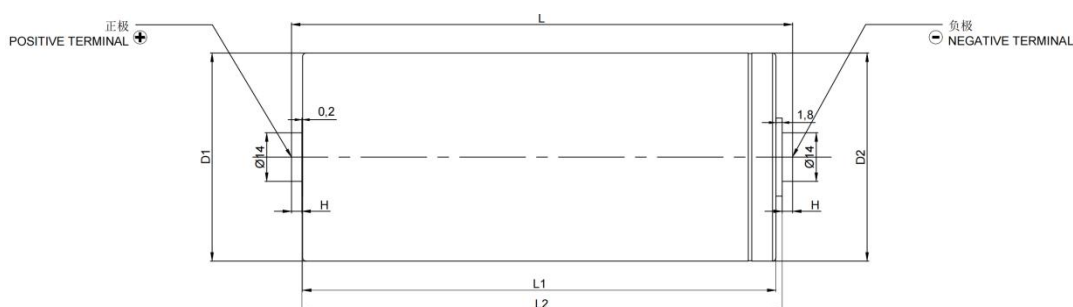
DIMENSIONS



CNPXXX PXXX K12



CNPXXX PXXX K14



| Part Number | Dimensions(mm) | | | |
|----------------------|----------------|------------|------------|--------------|
| | L2(±0.5mm) | D1(±0.5mm) | D2(±0.5mm) | Weight(±10g) |
| CNP1200 P270 K12/K14 | 85.0 | 60.0 | 61.0 | 320 |
| CNP1500P270 K12/K14 | 85.0 | 60.0 | 61.0 | 320 |
| CNP2000P270 K12/K14 | 103.0 | 60.0 | 61.0 | 380 |
| CNP3000P270 K12/K14 | 138.5 | 60.0 | 61.0 | 520 |
| CNP3400P270 K12/K14 | 138.5 | 60.0 | 61.0 | 525 |
| CNP3400P285 K12/K14 | 138.5 | 60.0 | 61.0 | 525 |
| CNP1200P300 K12/K14 | 85.0 | 60.0 | 61.0 | 320 |
| CNP1500P300 K12/K14 | 85.0 | 60.0 | 61.0 | 320 |
| CNP2000P300 K12/K14 | 103.0 | 60.0 | 61.0 | 380 |
| CNP3000P300 K12/K14 | 138.5 | 60.0 | 61.0 | 520 |
| CNP3400P300 K12/K14 | 138.5 | 60.0 | 61.0 | 525 |

STANDARD PRODUCTS



| Part Number | Working Voltage (V DC) | Rated Cap. (F) | Capacitance Tolerance | Max.ESR | | Maximum Leakage (72hrs/mA) | Rated Current (A) | Max. continuous Current(A) | | Peak Current 1s (A) | Power Density (kW/Kg) | Maximum Energy (W.h) | Energy Density (Wh/kg) |
|--------------|------------------------|----------------|-----------------------|-----------------|------------|----------------------------|-------------------|----------------------------|-----------|---------------------|-----------------------|----------------------|------------------------|
| | | | | ESRAC (1kHz/mΩ) | ESRDC (mΩ) | | | ΔT = 15°C | ΔT = 40°C | | | | |
| 2.7V Series | | | | | | | | | | | | | |
| CNP1200 P270 | 2.7 | 1200 | -0%to+20% | 0.18 | 0.29 | 2.8 | 100 | 107 | 175 | 1411 | 7.81 | 1.215 | 4.34 |
| CNP1500 P270 | 2.7 | 1500 | -0%to+20% | 0.18 | 0.29 | 2.8 | 100 | 107 | 175 | 1411 | 9.41 | 1.519 | 4.80 |
| CNP2000 P270 | 2.7 | 2000 | -0%to+20% | 0.15 | 0.26 | 3.0 | 100 | 129 | 210 | 1775 | 9.21 | 2.025 | 5.33 |
| CNP3000 P270 | 2.7 | 3000 | -0%to+20% | 0.15 | 0.21 | 5.2 | 100 | 149 | 244 | 2480 | 8.41 | 3.038 | 5.84 |
| CNP3400 P270 | 2.7 | 3400 | -0%to+10% | 0.15 | 0.18 | 10 | 100 | 161 | 263 | 2847 | 7.50 | 3.442 | 6.50 |
| 2.85V Series | | | | | | | | | | | | | |
| CNP3400 P285 | 2.85 | 3400 | -0%to+10% | 0.13 | 0.2 | 12 | 100 | 153 | 250 | 2884 | 7.37 | 3.836 | 7.37 |
| 3.0V Series | | | | | | | | | | | | | |
| CNP1200 P300 | 3.0 | 1200 | -0%to+20% | 0.20 | 0.31 | 8 | 100 | 103 | 169 | 1536 | 8.57 | 1.500 | 5.36 |
| CNP1500 P300 | 3.0 | 1500 | -0%to+20% | 0.20 | 0.31 | 8 | 100 | 103 | 169 | 1536 | 9.95 | 1.875 | 5.90 |
| CNP2000 P300 | 3.0 | 2000 | -0%to+20% | 0.18 | 0.29 | 10 | 100 | 120 | 200 | 1899 | 9.47 | 2.500 | 6.58 |
| CNP3000 P300 | 3.0 | 3000 | -0%to+20% | 0.15 | 0.22 | 12 | 100 | 146 | 238 | 2710 | 9.03 | 3.750 | 7.10 |
| CNP3400 P300 | 3.0 | 3400 | -0%to+10% | 0.13 | 0.2 | 12 | 100 | 153 | 250 | 3035 | 9.03 | 4.250 | 8.17 |

LIFE TIME AND TEMPERATURE PERFORMANCE

The life of a Super Capacitor is impacted by a combination of operating voltage and the operating temperature according to the following equation :

$$L = L_0 \times 3.25^{\frac{T_0 - T}{10}} \times 1.52^{\frac{V_0 - V}{0.1}}$$

L : is the theoretical lifetime at T temperature;

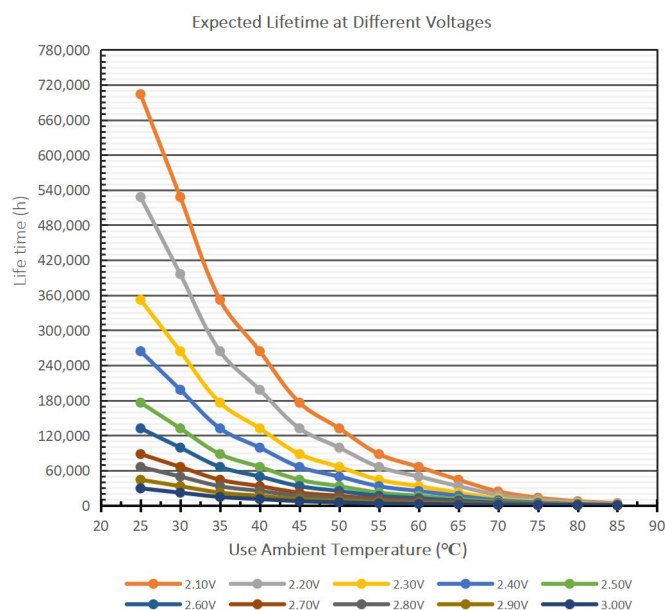
L_0 : is the working life of the highest rated working temperature;

T : is the actual working temperature;

T_0 : is the highest rated working temperature;

V : is the actual working voltage;

V_0 : is the highest rated working voltage.



*Note : Estimated lifespan: The estimated lifespan under different operating voltages and operating temperatures in a theoretical environment. For the actual service life, please contact us to discuss the working conditions.

TYPICAL PERFORMANCE

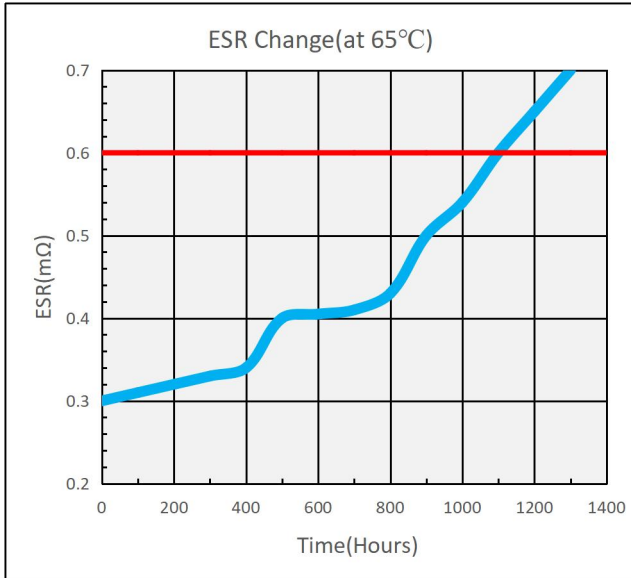


Figure 1: Accelerated Aging ESR Performance
 $V_R = 2.85V$, $T = 65^\circ C$

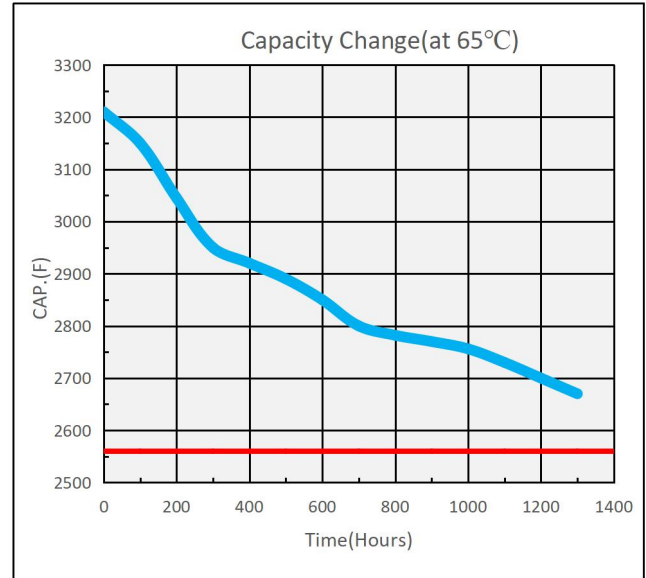


Figure 1: Accelerated Aging Capacitor Performance
 $V_R = 2.85V$, $T = 65^\circ C$

TEST PROCEDURES

1. Surge Voltage

Absolute maximum voltage, non-repetitive. Duration not to exceed 1 second.

2. Capacitance and ESRDC were measured at 25°C using a test current of 100 A.

3. Maximum Leakage Current

- Current measured after 72 hours at rated voltage and 25°C. Initial leakage current may be higher.
- Module leakage current is the sum of the battery and balancing circuits, if applicable.

4. Maximum peak current

- The current required to discharge the battery/module from rated voltage to half rated voltage in 1 second.

$$I = \frac{1/2 V_R}{\Delta t / C + ESR_{DC}}$$

Where Δt is the discharge time in seconds; in this case $\Delta t = 1$ second.

- The specified maximum peak current should not be used for normal operation and is for reference only.

5. Energy and Power (based on IEC 62391-2)

- Maximum energy storage:

$$E_{max}(Wh) = \frac{1/2 CV_R^2}{3600}$$

- Gravimetric Specific Energy:

$$(Wh/kg) = \frac{E_{max}}{mass}$$

- Usable Specific Power:

$$(W/kg) = \frac{0.12V_R^2}{ESR_{DC} \times mass}$$

- Impedance Match Specific Power:

$$(W/kg) = \frac{0.25V_R^2}{ESR_{DC} \times mass}$$

- Presented Power and Energy values are calculated based on Rated Capacitance & Rated (Max.) ESRDC, Initial values.

6. Cycle Life Test Profile

Cycle life varies depending upon application-specific characteristics. Actual results will vary.

7. Temperature Rise at Constant Current

$$\Delta T = I_{RMS}^2 \times ESR_{DC} \times R_{th}$$

where ΔT : Temperature rise over ambient ($^\circ C$)

I_{RMS} : Maximum continuous or RMS current (A)

R_{th} : Thermal resistance, cell to ambient ($^\circ C/W$)

ESR_{DC} : Rated (Max.) ESRDC (Ω).

(Note: Design should consider EOL ESR_{DC} for application temperature rise evaluation.)

8. All CDA supercapacitors have a capacity of less than 10Wh to meet the requirements of Special Regulation 361 according to the United Nations material classification UN3499.

Both individual ultracapacitors and modules composed of these ultracapacitors shipped by CDA can be transported without being considered dangerous goods (hazardous substances) according to the transport regulations.

9. BOL: Beginning of Life, rated initial product performance

EOL: End of Life criteria.

- Capacitance: 80% of min. BOL rating
- ESRDC: 2x max. BOL rating

* To ensure the safe use of CNP series products, please click this link: [White Paper on the User Manual of this Product](#)