



FEATURES

- Up to 1,000,000 duty cycles or 10 year DC life*
- High power and energy
- 650F 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	650F 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 1000 hours : Capacitance change: $\pm 20\%$ of initial rated value Internal resistance: Within 2 times of initial specified value
High temperature storage	After 65°C 1000 hours of storage Capacitance change: $\pm 20\%$ of initial rated value Internal resistance: Within 2 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 2 times of initial specified value
Humidity characteristic	Relative humidity: 90%~95% /Duration of testing:240 hrs /Temperature:40 \pm 2°C Capacitance change: Within $\pm 20\%$ of initial rated value Internal resistance: Within 2 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 2 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

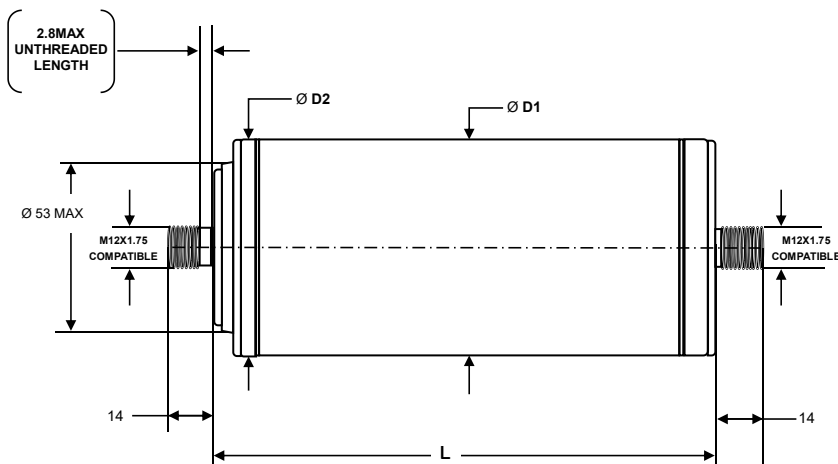
Casing Display:



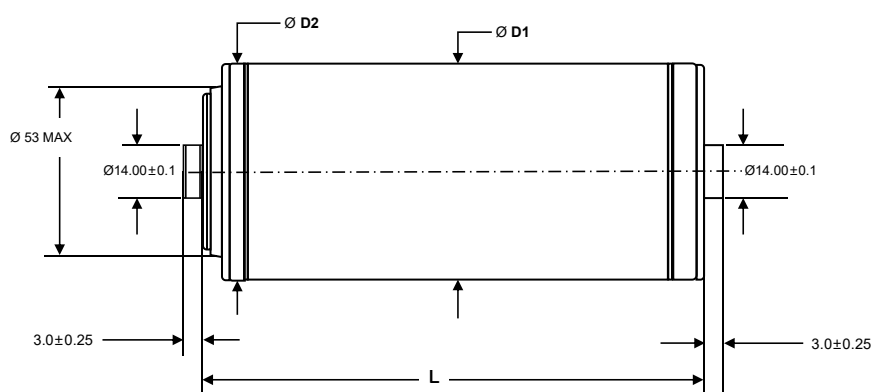
DIMENSIONS



CNPXXX PXXX K12



CNPXXX PXXX K14



Part Number	Dimensions(mm)			
	L(±0.5mm)	D1(±0.5mm)	D2(±0.5mm)	Weight(±5g)
CNP650 P270 K12/K14	51.0	60.0	61.0	180
CNP1200 P270 K12/K14	74.0	60.0	61.0	280
CNP1500P270 K12/K14	84.5	60.0	61.0	310
CNP2000P270 K12/K14	101.5	60.0	61.0	380
CNP3000P270 K12/K14	137.5	60.0	61.0	520
CNP3400P270 K12/K14	137.5	60.0	61.0	525
CNP3400P285 K12/K14	138.0	60.0	61.0	520
CNP650P300 K12/K14	51.0	60.0	61.0	180
CNP1200P300 K12/K14	74.0	60.0	61.0	280
CNP1500P300 K12/K14	85.0	60.0	61.0	310
CNP2000P300 K12/K14	102.0	60.0	61.0	380
CNP3000P300 K12/K14	138.0	60.0	61.0	520
CNP3400P300 K12/K14	138.0	60.0	61.0	520

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 (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													
CNP650 P270	2.7	650	-0%to+20%	0.40	0.60	1.8	65	75	108	631	8.10	0.658	3.66
CNP1200 P270	2.7	1200	-0%to+20%	0.25	0.40	2.5	100	110	145	1095	7.81	1.215	4.34
CNP1500 P270	2.7	1500	-0%to+20%	0.25	0.30	1.8	100	110	152	1475	9.41	1.519	4.90
CNP2000 P270	2.7	2000	-0%to+20%	0.18	0.25	1.8	100	125	180	1800	9.21	2.025	5.33
CNP3000 P270	2.7	3000	-0%to+20%	0.14	0.20	5.2	100	135	210	2531	8.41	3.038	5.84
CNP3400 P270	2.7	3400	-0%to+20%	0.14	0.22	1.8	100	135	210	2531	7.50	3.442	6.50
2.85V Series													
CNP3400 P285	2.85	3400	-0%to+20%	0.14	0.2	6.24	100	127	195	2665	7.37	3.836	7.37
3.0V Series													
CNP650 P300	3.0	650	-0%to+20%	0.45	0.70	2.16	65	70	98	670	8.57	0.813	4.54
CNP1200 P300	3.0	1200	-0%to+20%	0.30	0.45	3.00	100	105	139	1169	8.57	1.500	5.36
CNP1500 P300	3.0	1500	-0%to+20%	0.20	0.30	4.20	100	120	152	1475	9.95	1.875	6.05
CNP2000 P300	3.0	2000	-0%to+20%	0.20	0.35	12.35	100	120	170	1875	9.47	2.500	6.58
CNP3000 P300	3.0	3000	-0%to+20%	0.14	0.20	6.24	100	127	195	2665	9.03	3.750	7.21
CNP3400 P300	3.0	3400	-0%to+20%	0.14	0.20	6.24	100	127	195	2665	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;

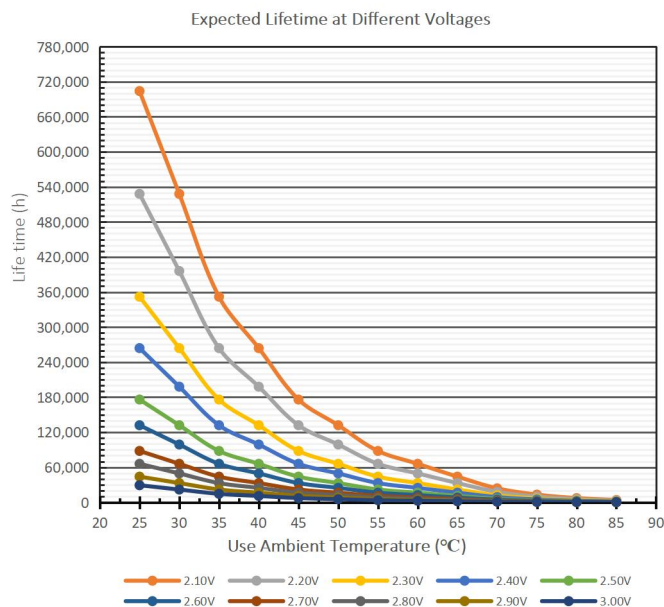
L₀ : is the working life of the highest rated working temperature;

T : is the actual working temperature;

T₀ : is the highest rated working temperature;

V : is the actual working voltage;

V₀ : 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

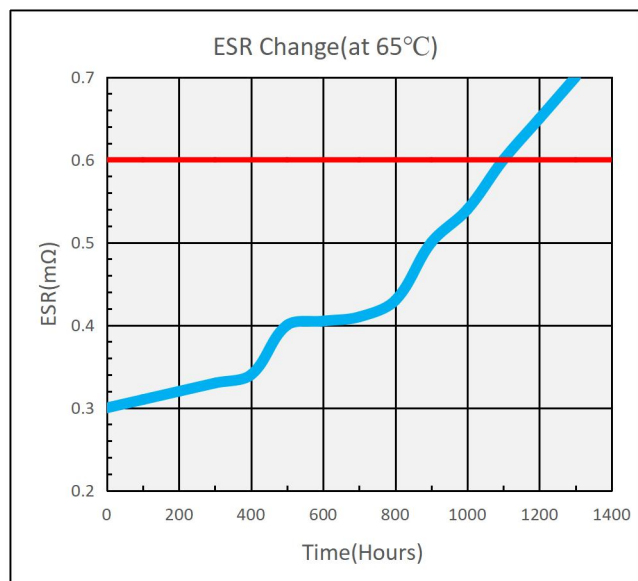


Figure 1: Accelerated Aging ESR Performance

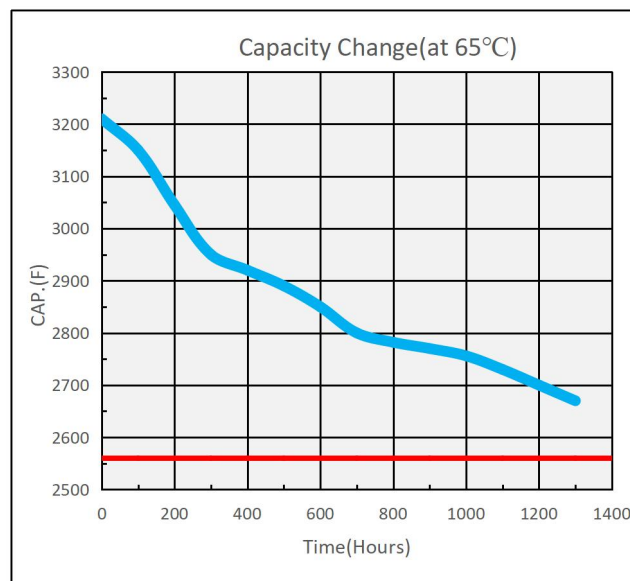
 $V_R = 2.85V, T = 65^\circ C$ 

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 (°C) I_{RMS} : Maximum continuous or RMS current (A) R_{th} : Thermal resistance, cell to ambient (°C/W) ESR_{DC} : Rated (Max.) ESRDC(Ω).

(Note: Design should consider EOL ESRDC 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