

## 2.7V CDCL WLH DATA SHEET



MODEL	2.7 V CDCL WLH
PART NUMBER	CDCL4000C0-0002R7WLH

Version	Revision Records
V2021-1	Template Update

FEATURES
Low ESR & high power density
1,000,000 duty cycles
Laser weldable terminals

APPLICATIONS	
EV/HEV	Heavy duty machinery
Hybrid drive trains	Locomotive engine start-up system
Mass transportation braking energy recovery system	

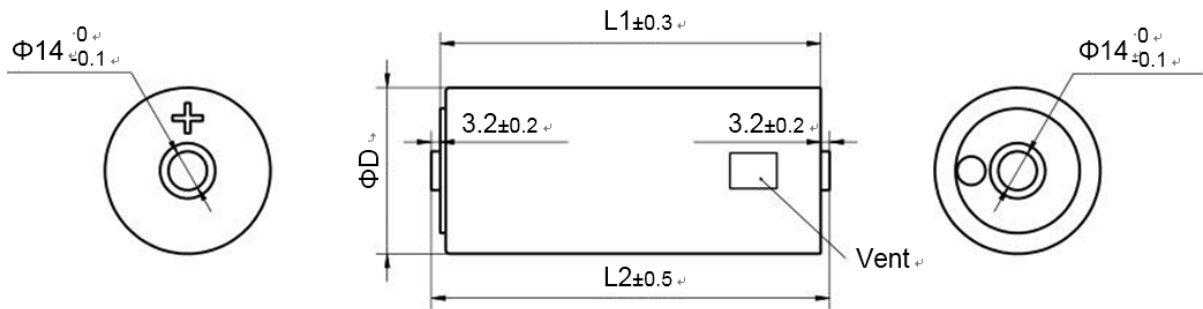
## CONSTRUCTION & DIMENSIONS

### 1) Construction

Inside structure: fold anode and cathode electrode with separator

Outer structure: aluminum case, insulating sleeve

### 2) Dimensions



PRODUCT	DIMENSION (mm)		
	D(Max.)	L1	L2
CDCL4000C0-0002R7WLH	60.8	138	144.4

## SPECIFICATIONS

Items	Characteristics
Operating Voltage	2.7 VDC
Surge Voltage	2.85 VDC
Operating Temperature Range	-40°C to 65°C
Vibration Specification	ISO 16750-3 TABLE 14
Shock Specification	SAE J2464 TABLE 4
Capacitance Tolerance	0% to +20% (25°C)
Terminals	Laser weldable posts
Temperature Performance (-40°C to 65°C)	$C_{end} \geq 95\%$ of initial value $ESR_{end} \leq 150\%$ of initial value

### SPECIFICATIONS

Accelerated DC Life (1,500 hours @ 65°C, 2.7V DC)	$C_{end} \geq 80\%$ of initial value $ESR_{end} \leq 200\%$ of initial value
Projected Life Time (10years, @RT, 2.7V DC)	$C_{end} \geq 80\%$ of initial value $ESR_{end} \leq 200\%$ of initial value
Cycle Life (1,000,000 cycles between $V_R$ and $1/2V_R$ )	$C_{end} \geq 80\%$ of initial value $ESR_{end} \leq 200\%$ of initial value
Shelf Life (4years, @RT, uncharged)	$C_{end} \geq$ rated value $ESR_{end} \leq$ rated value

### DETAIL SPECIFICATIONS

Part Number		CDCL4000C0-0002R7WLH
Rated Capacitance (F)		4000
Rated ESR (mΩ)	AC ESR (1kHz)	0.22
	DC ESR (0.1s)	0.25
	DC ESR (1s)	0.27
	DC ESR (5s)	0.29
Leakage Current (mA, RT 72hrs)		8.0
Stored Energy (Wh)		4.05
Energy Density (Wh/kg)		7.7
Max. Continuous Current ( $\Delta T=15^\circ\text{C}$ , A)		134
Max. Continuous Current ( $\Delta T=40^\circ\text{C}$ , A)		218
Max. Peak Current (A, 1s)		2596
Short Circuit Current (kA)		10.8
Usable Power Density (kW/kg)		6.2

Part Number	CDCL4000C0-0002R7WLH
Impedance Match Power Density (kW/kg, 10 Hz)	13.9
Typical Thermal Resistance (°C/W)	3.1
Typical Thermal Capacitance (J/°C)	618
Typical Mass (g)	525
Max. Mass (g)	530

### Notes

- 1) Surge voltage  $V_S$ : Absolute maximum voltage, non-repetitive. The duration must not exceed 1 second.
- 2) Capacitance  $C$ : The test current is 40C, apply 100A when the calculated current exceeding 100A; The test method is shown in Figure 1.

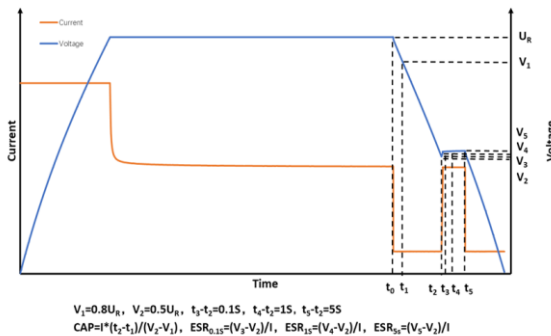


Figure 1

- 3) Capacitance tolerance: Typical tolerance is +5%.
- 4) Leakage current measurement procedure: 1) Charge the capacitor to the  $V_R$  with a constant current (40C, apply 100A when the calculated current exceeding 100A). 2) Hold the voltage at  $V_R$  for 72h. 3) The current to maintain  $V_R$  after 72 h is the leakage current.

- 5) Max. Continuous Current:  $I_{MCC} = \sqrt{\Delta T / (ESR_{1S} * R_{Th})}$
- 6) Max. Peak Current:  $I_S = 0.5C * V_R / (\Delta t + ESR_{1S} * C)$ , discharge from  $V_R$  to  $V_R/2$  in 1 second.
- 7) Short current:  $I_S = V_R / ESR_{0.1S}$
- 8) Stored energy:  $E = 0.5C * V^2 / 3600$
- 9) Energy density:  $E_d = E / M$
- 10) Usable power density:  $P_d = 0.12V_R^2 / (ESR_{1S} * M)$
- 11) Matched impedance power density:  $P_{dMax} = 0.25V_R^2 / (ESR_{0.1S} * M)$
- 12) Storage: Discharged and no load applied at RT. (Cell voltage < 0.2 V)
- 13) Standard markings:
  - Name of manufacturer, part number, serial number.
  - Rated voltage and capacitance, negative and positive terminals, warning marking.
  - Stored energy in watt-hours.
- 14) Per UN3499, all SPSCAP ultracapacitors have less than 10 Wh capacity, meeting the requirements of Special Provisions 361. When packaged according to the regulation, the ultracapacitors shipped by SPSCAP can be transported without being treated as dangerous goods (hazardous materials).

All rights reserved. Design and specifications are subjected to change without notice.

### NINGBO CRRC NEW ENERGY TECHNOLOGY CO.,LTD.

Add: No.199 shidai Road,Wuxiang Town,Yinzhou District,  
 Ningbo,Zhejiang,China  
 Email: info@spscap.com  
 Website: www.spscap.com

