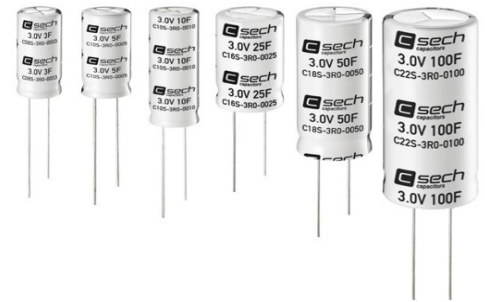


Product Datasheet

Small cell ultracapacitors – solderable type

- Rated voltage 3VDC
- 3 up to 100F capacitance
- High capacitance and low ESR
- High cycle life of 500'000 cycles
- Excellent DC life performance
- Wetting proof design
- Small size



ELECTRICAL SPECIFICATIONS

Type	C08S-3R0-0003	C10S-3R0-0005	C10S-3R0-0010	C16S-3R0-0025	C18S-3R0-0050	C22S-3R0-0100
Rated Voltage V_R	3.00 V	3.00 V	3.00 V	3.00 V	3.00 V	3.00 V
Surge Voltage V_S^1	3.15 V	3.15 V	3.15 V	3.15 V	3.15 V	3.15 V
Rated Capacitance C^2	3 F	5 F	10 F	25 F	50 F	100 F
Capacitance Tolerance 3	-10% / +20%	-10% / +20%	-10% / +20%	-10% / +20%	-10% / +20%	-10% / +20%
ESR, 1kHz 2 (Typical Values)	60 mΩ (41 mΩ)	50 mΩ (27 mΩ)	30 mΩ (16 mΩ)	20 mΩ (14 mΩ)	10 mΩ (8 mΩ)	8 mΩ (7 mΩ)
ESR, DC 2 (Typical Values)	105 mΩ (63 mΩ)	90 mΩ (39 mΩ)	45 mΩ (30 mΩ)	30 mΩ (20 mΩ)	20 mΩ (13 mΩ)	13 mΩ (12 mΩ)
Leakage Current I_L^4	0.010 mA	0.015 mA	0.030 mA	0.070 mA	0.15 mA	0.3 mA
Max Peak Current I_{Max}^5	3.42 A	5.17 A	10.34 A	21.43 A	37.5 A	65.2 A
Usable Continuous Current I_S^6	1.3A	1.6A	2.5A	3.4A	5.5A	10.7A
Stored Energy E^7	3.75 mWh	6.25 mWh	12.5 mWh	31 mWh	62.5 mWh	0.125 Wh
Energy Density E_d^8	2.34 Wh/kg	2.72 Wh/kg	3.57 Wh/kg	4.17 Wh/kg	4.63 Wh/kg	5.95 Wh/kg
Matched Impedance Power Density P_{dMax}^9	13.4 kW/kg	10.9 kW/kg	14.3 kW/kg	10 kW/kg	8.3 kW/kg	8.2 kW/kg

THERMAL CHARACTERISTICS

Type	C08S-3R0-0003	C10S-3R0-0005	C10S-3R0-0010	C16S-3R0-0025	C18S-3R0-0050	C22S-3R0-0100
Working Temperature	-40 ~ 65°C	-40 ~ 65°C	-40 ~ 65°C	-40 ~ 65°C	-40 ~ 65°C	-40 ~ 65°C
Storage Temperature 14	-40 ~ 70°C	-40 ~ 70°C	-40 ~ 70°C	-40 ~ 70°C	-40 ~ 70°C	-40 ~ 70°C
Temperature Characteristics	Capacitance change within ±5% of value at RT ESR change within ±150% of value at RT					
Thermal Resistance R_{Th}^{10}	82 K/W	69K/W	54K/W	43K/W	25K/W	10K/W

LIFETIME CHARACTERISTICS

Type	C08S-3R0-0003	C10S-3R0-0005	C10S-3R0-0010	C16S-3R0-0025	C18S-3R0-0050	C22S-3R0-0100
DC Life at High Temperature 11	1000 hours					
DC Life at RT 12	10 years					
Cycle Life 13	500'000 cycles					
Shelf Life 14	3 years					

SAFETY & ENVIRONMENTAL SPECIFICATIONS

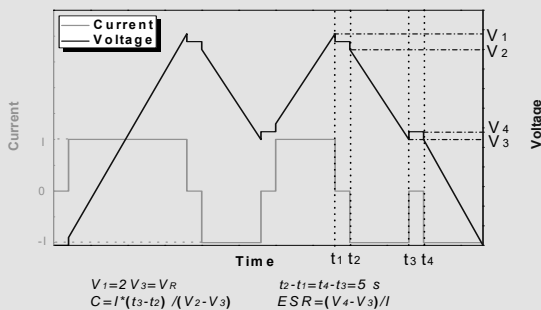
Type	C08S-3R0-0003	C10S-3R0-0005	C10S-3R0-0010	C16S-3R0-0025	C18S-3R0-0050	C22S-3R0-0100
Safety	RoHS, REACH and UL810					
Shock and vibration	MIL-STD-202, Method 213, Fig. 1, condition C; Method 204 (acc. AEC-Q200)					

PHYSICAL PARAMETERS

Type	C08S-3R0-0003	C10S-3R0-0005	C10S-3R0-0010	C16S-3R0-0025	C18S-3R0-0050	C22S-3R0-0100
Mass M	1.6 g	2.3 g	3.5 g	7.5 g	13.5 g	22.5 g
Terminals (wire leads)	Solderable ¹⁶	Solderable ¹⁶	Solderable ¹⁶	Solderable ¹⁶	Solderable ¹⁶	Solderable ¹⁶
Dimensions ¹⁷ Diameter D	8.0 mm	10.0 mm	10.0 mm	16.0 mm	18.0 mm	22.0 mm
Length L	20.0 mm	20.0 mm	30.0 mm	25.0 mm	40.0 mm	45.0 mm
Lead distance P	3.5 mm	5.0 mm	5.0 mm	7.5 mm	7.5 mm	10.0 mm
Lead diameter d	0.6 mm	0.6 mm	0.6 mm	0.8 mm	0.8 mm	1.0 mm

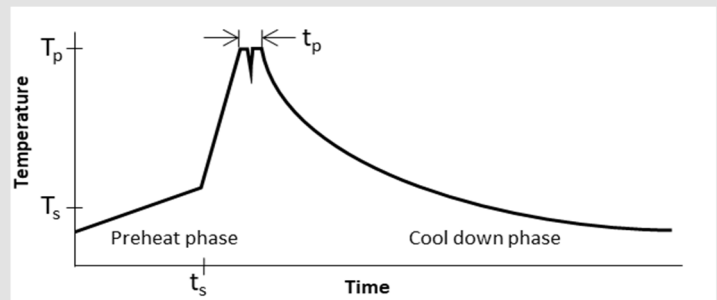
NOTES:

- Surge voltage V_s : Absolute maximum voltage, non-repetitive. The duration must not exceed 1 second.
- Capacitance C: The test current is 0.075 A/F, if the calculated current is >100A, then apply 100A.



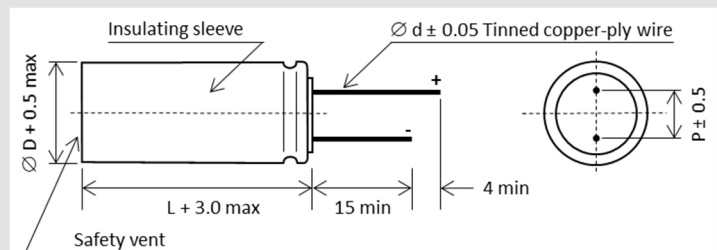
- Capacitance tolerance: Typical tolerance is +5%~+10%.
- Leakage current measurement procedure: 1) Charge the capacitor to the V_R with a constant current (0.075 A/F, if the calculated current is >100A, then apply 100A). 2) Hold the voltage at V_R for 72h. 3) The current to maintain V_R after 72 h is the leakage current.
- Max current: $I_{Max} = 0.5C * V_R / (\Delta t + ESR * C)$, discharge from V_R to $V_R/2$ in 1 second.
- Max constant working current: $I_{MCC} = \sqrt{\Delta T / (ESR * R_{Th})}$
- Stored energy: $E = 0.5C * V^2 / 3600$
- Energy density: $E_d = E / M$
- Matched impedance power density: $P_{dMax} = (0.25V_R^2 / ESR) / M$
- Thermal resistance ($\Delta T = 15^\circ\text{C}$): $R_{Th} = \Delta T / P$, where $P = ESR * I^2$
- DC life at high temperature: Hold the capacitor charged at rated voltage at 65°C for 1000h. The capacitance shall be >70% of the rated value, the ESR shall be <200% of the rated value.
- DC life at RT: Hold the capacitor charged at rated voltage at room temperature RT, the capacitance shall be >80% of the rated value, the ESR shall be <200% of the rated value.
- Cycle life: Charge and discharged the capacitor in the range between V_R and $V_R/2$. 5 seconds waiting period between charge and discharge. The constant test current is 0.075 A/F (if the calculated current >100A, then apply 100A).
- Storage temperature: Storage in discharge state, < 35°C
- Shelf life: Stored uncharged at RT, <50% RH

- Wave solder profile



Profile feature	Standard SnPb	Pb free
Preheat/soak temperature T_s	100°C	100°C
Preheat/soak time t_s	60 s	60 s
Peak temperature T_p	220 – 260°C	250 – 260°C
Time to peak temperature t_p	10s max, 5s max/wave	10s max, 5s max/wave
Ramp-down rate	2-5 K/s	2-5 K/s
Time solder process (RT to RT)	4 min	4 min

- Dimensions:



Notes:

Standard markings:

- + Name of manufacturer, part number, serial number
- + Rated voltage and capacitance, negative and positive terminals, warning marking
- + Stored energy in watt-hours

Mounting recommendations:

- + Mounting without applying undue mechanical stress on the terminals
- + Provide adequate spacing in between cells to secure required insulation strength
- + Provide clearance around the safety vent and do not position anything above the safety vent that may be damaged in an event of vent rupture

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