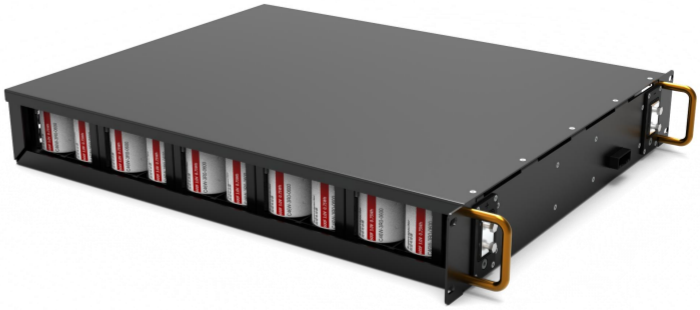
GMCC CRAMS

240V 7.5F Supercapacitor Module

- 240V DC output
- 7.5F Capacitance
- High cycle life of 1 million cycles
- Passive balance management
- Very high power density
- Laser-weldable posts
- Ecology



ELECTRICAL SPECIFICATIONS

TYPE	M22W-240-0007
Rated Voltage V_R	240 V
Surge Voltage V_S[1]	248 V
Rated Capacitance C[2]	7.5 F
Capacitance Tolerance[3]	-0% / +20 %
ESR[2]	≤67 mΩ
Leakage Current IL[4]	<3 mA
Self-discharge Rate[5]	<20 %
Cell specification	3V 600F
Maximum storage capacity of a single cell E[9]	0.75 Wh
Module configuration	1 P 80 S
Constant Current $I_{MCC}(\Delta T = 15°C)$[6]	39 A
Max Current I_{Max}[7]	0.6 kA
Short Current I_S[8]	3.6 kA
Stored Energy E[9]	60 Wh
Energy Density E_d[10]	3 Wh/kg
Usable Power Density P_d[11]	5.2 kW/kg
Matched Impedance Power P_{dMax}[12]	10.8 kW/kg
Insulation withstand voltage class	4800V DC/min

THERMAL CHARACTERISTICS

TYPE	M22W-240-0007
Working Temperature	-40 ~ 65°C
Storage Temperature[13]	-40 ~ 70°C
Thermal Resistance R_{Th}[14]	0.15 K/W
Thermal Capacitance C_{th}[15]	24000 J/K

LIFETIME CHARACTERISTICS

TYPE	M22W-240-0007
DC Life at High Temperature[16]	1500 hours
DC Life at RT[17]	10 years
Cycle Life[18]	1'000'000 cycles
Shelf Life[19]	4 years

SAFERTY & ENVIRONMENTAL SPECIFICATIONS

TYPE	M22W-240-0007
Safety	DL / T 2080-2020
Vibration	DL / T 2080-2020
Shock	NA
Degree of protection	NA

MONITORING / BATTERY VOLTAGE MANAGEMENT

TYPE	M22W-240-0007
Internal temperature sensor	NTC RTD (10K)
Temperature interface	simulation
Battery voltage detection	Module overvoltage alarm signal, passive node signal, module alarm voltage: Dc141.6~146.4v
Battery voltage management	Comparator passive equalization management

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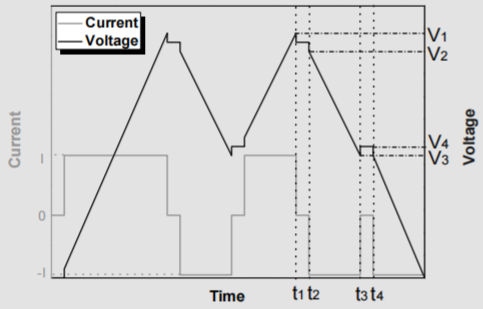
PHYSICAL PARAMETERS

TYPE	M22W-240-0007
Mass M	≤20 kg
Terminals(leads)[20]	M5，torque 6-8N.m
Signal terminal	4pin terminal，2pinOptical coupling output，2pinTemperature output
Cooling mode	Natural cooling
Dimensions[21] Length×Width×Height	435×581.5×82.5 mm
Module mounting hole position	Drawer type installation

NOTES:

TYPE — **M22W-240-0007**

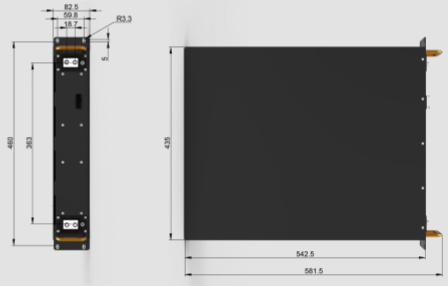
1. Surge voltage VS: Absolute maximum voltage, non-repetitive. The duration must not exceed 1 second.
2. Rated capacity C: the rated capacity test method is as shown in Figure 1. The test current is 100 C multiple current, i.e. 0.075 A / F. if the calculated test current is greater than 100 A, 100 A is used.



$V_1=2V_3=V_R$ $t_2-t_1=t_4-t_3=5$ s

$C=I*(t_3-t_2)/(V_2-V_3)$ $ESR=(V_4-V_3)/I$

3. Capacitance tolerance: Typical capacity is 105% of rated capacity.
4. Leakage current measurement procedure: 1) Charge the capacitor to the VR with a constant current (0.075 A/F, if the calculated current is >100A, then apply 100A). 2) Hold the voltage at VR for 72h. 3) The current to maintain VR after 72 h is the leakage current.
5. Self-discharge rate measurement procedure: 1) Charge the capacitor to VR with a constant current (0.075 A/F, if the calculated current >100A, then apply 100A). 2) Hold the voltage at VR for 3h. 3) Floating for 72h. 4) Measure the voltage after 72 h.
6. Max constant working current: $I_{MCC}=\sqrt{\Delta T/(ESR*R_{Th})}$ the working current of the supercapacitor in static air depends on the natural convection heat dissipation of the shell and the Joule heat balance.
7. Max current: $IMax = 0.5C*VR\ (\Delta t + ESR*C)$, discharge from VR to VR /2 in 1 second.
8. Short current: $Is = VR/ESR$ Each parameter adopts SI system unit or its conversion unit, This current can't be used as working current.
9. Stored energy: $E = 0.5C*V^2/3600$.
10. Energy density: $E_d = E/M$
11. Usable power density: $P_d = 0.12V_R^2/(ESR*M)$.
12. Impedance match power density: $P_{dMax} = 0.25V_R^2/(ESR*M)$
13. Storage temperature: discharged state(cell voltage < 0.2 V).
14. Thermal resistance: $R_{Th} = 1/(h*A)$,, where h=10 W/(m2*K), A=surface area.
15. Thermal capacitance: For the whole capacitor.
16. DC Life at High Temperature: Under the maximum working temperature of the supercapacitor (65 ° C), it is constant at its rated voltage for 1500h, the capacity is kept above 80% of the rated capacity under normal temperature, and the internal resistance is below 200% of the rated internal resistance.
17. DC Life at RT: keep the supercapacitor at its rated voltage. The life criterion is that the capacity is kept above 80% of the rated capacity, and the internal resistance is below 200% of the rated internal resistance.
18. Cycle life: Charge and discharged the capacitor in the range between VR and VR /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).
19. Storage life: within the storage temperature range, keep the discharge state, no load (cell voltage < 0.2 V).
20. The signal leads to the end: 0.5mm2 Lead leads to
21. Dimensions: M22W-240-0007



22. Standard marking
23. + Name of manufacturer, part number, serial number
    + Rated voltage and capacitance, negative and positive terminals, warning marking
    + Stored energy in watt-hours.
24. Mounting recommendations:
25. + Recommended welding depth is not less than 1.8 mm.
    + Provide sufficient distance between cells to meet the insulation strength.
    + Keep enough space around the explosion-proof tank and keep the top clean and avoid mechanical damage.
26. The contents of this document are subject to change without notice. GMCC accepts no liability for the accuracy or credibility of the values and information contained in this document.