Product Datasheet

ESS Module

- Rated voltage 144VDC
- 63F capacitance
- Ultra-low ESR
- Stackable 19" rack design
- Laser welded connections
- Innovative cell management
- Integrated voltage and temperature monitoring
- CAN bus communication

ELECTRICAL SPECIFICATIONS		
Type	**M35W-144-0063**	**M35W-144-P063**
Rated Voltage V_R	144.00 V	144.00 V
Surge Voltage V_S[1]	148.80 V	148.80 V
Rated Capacitance C[2]	63 F	62.5 F
Capacitance Tolerance[3]	0% / +20%	0% / +20%
DC ESR[2]	12 mΩ	9.0 mΩ
Leakage Current I_L[4]	<30 mA	<30 mA
Constant Current (ΔT = 15°C)[5] passive cooling	79 A	91 A
Constant Current (ΔT = 15°C)[5] active air cooling 60 CFM	177 A	205 A
Max Current I_{Max}[6]	2.6 kA	2.9 kA
Short Current I_S[7]	12 kA	16 kA
Stored Energy E[8]	181 Wh	180 Wh
Energy Density E_d[9]	5.6 Wh/kg	5.6 Wh/kg
Usable Power Density P_d[10]	6.8 kW/kg	8.8 kW/kg
Impedance Match Power Density P_{dMax}[11]	13.5 kW/kg	17.8 kW/kg

THERMAL CHARACTERISTICS		
Type	**M35W-144-0063**	**M35W-144-P063**
Working Temperature	-40 ~ 65°C	-40 ~ 65°C
Storage Temperature[12]	-40 ~ 70°C	-40 ~ 70°C
Thermal Resistance R_{Th}[13] Passive cooling	0.2°C/W	0.2°C/W
Thermal Resistance R_{Th}[13] Active air cooling 60 CFM	0.04°C/W	0.04°C/W
Thermal Capacitance C_{Th}[14]	36 kJ/°C	36.5 kJ/°C

LIFETIME CHARACTERISTICS		
Type	**M35W-144-0063**	**M35W-144-P063**
DC Life at High Temperature[15]	1500 hours	1500 hours
DC Life at RT[16]	10 years	10 years
Cycle Life[17]	1'000'000 cycles	1'000'000 cycles
Shelf Life[18]	4 years	4 years

SAFETY & ENVIRONMENTAL SPECIFICATIONS		
Type	**M35W-144-0063**	**M35W-144-P063**
Safety	RoHS, REACH	
Vibration	Seismic Standard IEC 60068-3-3 Zone 3	
Rated insulation voltage (maximum series voltage)	1500 VDC	

MONITORING AND CELL VOLTAGE MANAGEMENT (CMS)

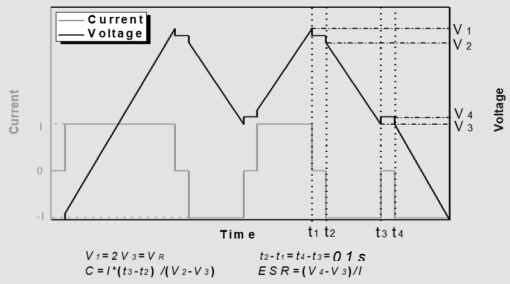
Type	M35W-144-0063	M35W-144-P063
Connector	Phoenix MCV1.5/8-GF-3.81	
Auxiliary power supply	24V ± 10% 5W	
Cell Voltage Monitoring and Management[19]	Microprocessor based, individual cell balancing	
Temperature Sensor	4x NTC (10kOhm @25°C)	
Communication interface	CAN bus 2.0A	

PHYSICAL PARAMETERS

Type		M35W-144-0063	M35W-144-P063
Mass M, typical		32 kg	32.5 kg
Power Terminals		M8[20]	M8[20]
Dimensions[21]	Length	555 mm	555 mm
	Width	483 mm	483 mm
	Height	150 mm	150 mm

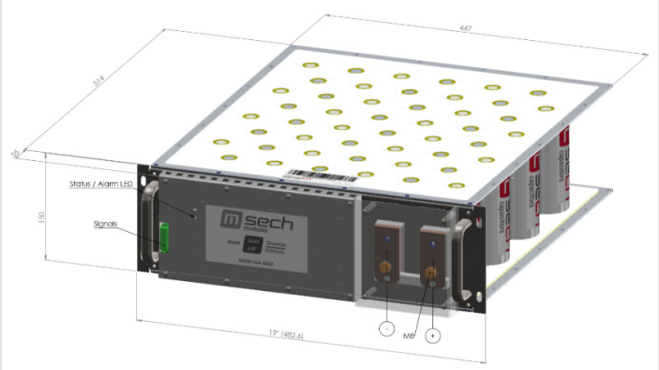
NOTES:

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



3. Capacitance tolerance: Typical tolerance is +5%~+10%.
4. 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.

   Leakage current may be greater if balancing is activated.
5. Max constant working current: $I_{MCC} = \sqrt{\Delta T/(ESR * R_{Th})}$
6. Max current: $I_{Max} = 0.5C * V_R/(\Delta t + ESR * C)$, discharge from V_R to $V_R/2$ in 1 second.
7. Short current: $I_S = V_R/ESR$
8. Stored energy: $E = 0.5C * V^2/3600$
9. Energy density: $E_d = E/M$
10. Usable power density: $P_d = 0.125V_R^2/(ESR * M)$
11. Impedance match power density: $P_{dMax} = 0.25V_R^2/(ESR * m)$
12. Storage temperature: Storage in discharge state.
13. Thermal resistance: $R_{Th} = \Delta T/P$, where P=ESR * I^2
14. Thermal capacitance is indicated for the whole module.
15. DC life at high temperature: Hold the capacitor charged at rated voltage at 65°C for 1500h. The capacitance shall be >80% of the rated value, the ESR shall be <200% of the rated value.
16. 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.
17. 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).
18. Shelf life: Discharged and no load applied at RT.
19. See detailed CMS datasheet and user manual.
20. The maximum torque is 15Nm for M8.
21. 19" rack module with a height of 4U



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