Product Datasheet

ESS Module

- Optimized for grid and power supply integration
- Modular 19" rack-mountable design
- Precision laser-welded connections
- Built-in voltage and temperature monitoring
- CAN bus communication interface
- High dielectric strength for enhanced safety
- Advanced thermal management for optimal cooling

ELECTRICAL SPECIFICATIONS

Part number Type	20-00001031 - M35W-144-0063	22-00001377 - M35W-144-P063	M35W-144-0071	M35W-130-0104
Rated Voltage V_R	144 V			130 V
Surge Voltage V_S[1]	148.8 V			134.4 V
Rated Capacitance C[2]	63 F		71 F	104 F
Capacitance Tolerance[3]	0% / +20%			
ESR[2]	12 mΩ	9.0 mΩ	12.5 mΩ	14 mΩ
Leakage Current I_L[4]	<30 mA			
Constant Current (ΔT = 15°C)[5] passive cooling	79 A	91 A	78 A	72 A
Constant Current (ΔT = 15°C)[5] active cooling 4m/s	177 A	205 A	174 A	152 A
Max Current I_{Max}[6]	2.6 kA	2.9 kA	2.7 kA	2.7 kA
Short Current I_S[7]	12 kA	16 kA	12 kA	9.2 kA
Stored Energy E[8]	180 Wh		205 Wh	243 Wh
Energy Density E_d[9]	5.6 Wh/kg	5.6 Wh/kg	6.3 Wh/kg	7.3 Wh/kg
Usable Power Density P_d[10]	6.8 kW/kg	8.9 kW/kg	6.4 kW/kg	4.5 kW/kg
Impedance Match Power Density P_{dMax}[11]	13.5 kW/kg	17.8 kW/kg	13.0 kW/kg	9.1 kW/kg

THERMAL CHARACTERISTICS

Type	M35W-144-0063	M35W-144-P063	M35W-144-0071	M35W-130-0104
Working Temperature	-40 ~ 65°C			
Storage Temperature[12]	-40 ~ 70°C			
Thermal Resistance R_{Th}[13] passive cooling	0.2°C/W			
Thermal Resistance R_{Th}[13] active cooling 60 CFM	0.04°C/W			
Thermal Capacitance C_{Th}[14]	36 kJ/°C			

LIFETIME CHARACTERISTICS

Type	M35W-144-0063	M35W-144-P063	M35W-144-0071	M35W-130-0104
DC Life at High Temperature[15]	1500 hours			
DC Life at RT[16]	10 years			
Cycle Life[17]	1'000'000 cycles			
Shelf Life[18]	4 years			

SAFETY & ENVIRONMENTAL SPECIFICATIONS

Type	M35W-144-0063	M35W-144-P063	M35W-144-0071	M35W-130-0104
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)

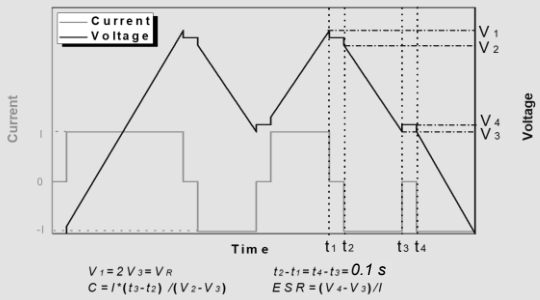
Type	M35W-144-0063	M35W-144-P063	M35W-144-0071	M35W-130-0104
Connector	Phoenix MCV1.5/8-GF-3.81			
Auxiliary power supply	24V ± 10% 5W			
Cell Voltage Monitoring and Management[19]	Microprocessor based, individual cell balancing			
Temperature Sensor	4x NTC (10kOhm @25°C)			
Communication interface	CAN bus 2.0A			

PHYSICAL PARAMETERS

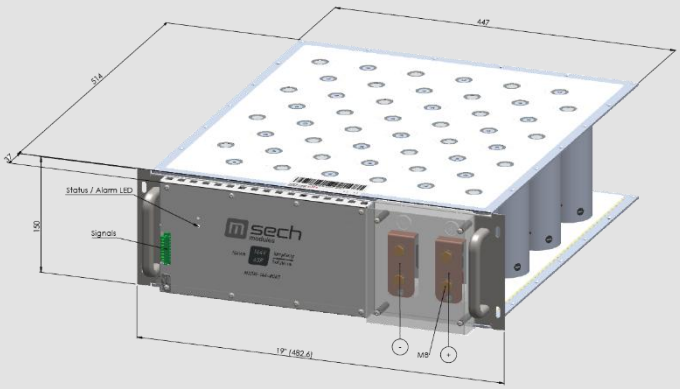
Type	M35W-144-0063	M35W-144-P063	M35W-144-0071	M35W-130-0104
Mass M, typical	32 kg		32.5 kg	33 kg
Power Terminals[20]	M8			
Dimensions[21] L x W x H	555 x 483 x 150 mm (19" 4U)			

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 module to V_R.
   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: $I_5 = V_R/ESR$
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 * I²
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.
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