

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
Rated Voltage V_R	144.00 V
Surge Voltage V_S^1	148.80 V
Rated Capacitance C^2	63F
Capacitance Tolerance ³	0% / +20%
DC ESR ²	12 mΩ
Leakage Current I_L^4	<25 mA
Constant Current ($\Delta T = 15^\circ C$) ⁵ passive cooling	79 A
Constant Current ($\Delta T = 15^\circ C$) ⁵ active air cooling 60 CFM	177 A
Max Current I_{Max}^6	2.6 kA
Short Current I_S^7	12 kA
Stored Energy E^8	180 Wh
Energy Density E_d^9	5.6 Wh/kg
Usable Power Density P_d^{10}	6.8 kW/kg
Impedance Match Power Density P_{dMax}^{11}	13.5 kW/kg

THERMAL CHARACTERISTICS

Type	M35W-144-0063
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 air cooling 60 CFM	0.04°C/W
Thermal Capacitance C_{Th}^{14}	36 kJ/°C

LIFETIME CHARACTERISTICS

Type	M35W-144-0063
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
Safety	RoHS, REACH
Vibration	Seismic Standard IEC 60068-3-3 Zone 3
Rated insulation voltage (maximum series voltage)	1kVDC according Railway Standard IEC 62497-1

MONITORING AND CELL VOLTAGE MANAGEMENT (CMS)

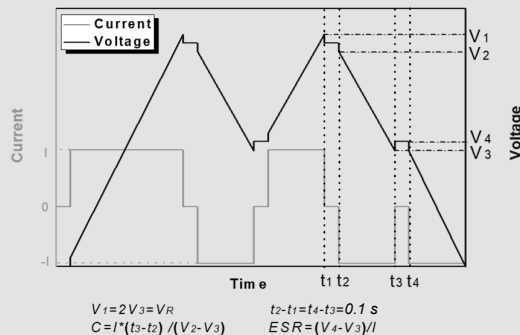
Type	M35W-144-0063
Connector	Phoenix MCV1.5/8-GF-3.81
Auxiliary power supply	24V ± 10% 5W
Cell Voltage Monitoring and Management ¹⁹	Microprocessor based, individual cell balancing
Temperature Sensor	4x NTC (10kOhm @25°C)
Communication interface	CAN bus 2.0A

PHYSICAL PARAMETERS

Type	M35W-144-0063
Mass M, typical	32 kg
Power Terminals	M8 ²⁰
Dimensions ²¹	
Length	555 mm
Width	483 mm
Height	150 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 72 h is the leakage current.
- Max constant working current: $I_{MCC} = \sqrt{\Delta T / (ESR * R_{Th})}$
- Max current: $I_{Max} = 0.5C * V_R / (\Delta t + ESR * C)$, discharge from V_R to $V_R/2$ in 1 second.
- Short current: $I_S = V_R / ESR$
- Stored energy: $E = 0.5C * V^2 / 3600$
- Energy density: $E_d = E / M$
- Usable power density: $P_d = 0.125V_R^2 / (ESR * M)$
- Impedance match power density: $P_{dmax} = 0.25V_R^2 / (ESR * m)$
- Storage temperature: Storage in discharge state.
- Thermal resistance: $R_{Th} = \Delta T / P$, where $P = ESR * I^2$
- Thermal capacitance is indicated for the whole module.
- 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.

- 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).
- Shelf life: Discharged and no load applied at RT.
- See detailed CMS datasheet and user manual.
- The maximum torque is 25Nm for M8.
- 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

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