

Product Datasheet

ESS Module

- Rated voltage 144VDC
- 71F 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-144-0071 |
|---|---------------|
| Rated Voltage V_R | 144.00 V |
| Surge Voltage V_S^1 | 148.80 V |
| Rated Capacitance C^2 | 71 F |
| Capacitance Tolerance ³ | 0% / +20% |
| DC ESR ² | 12 m Ω |
| Leakage Current I_L^4 | <30 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 | 2.7 kA |
| Short Current I_S^7 | 12 kA |
| Stored Energy E^8 | 205 Wh |
| Energy Density E_d^9 | 6.3 Wh/kg |
| Usable Power Density P_d^{10} | 6.7 kW/kg |
| Impedance Match Power Density P_{dMax}^{11} | 13.2 kW/kg |

THERMAL CHARACTERISTICS

| Type | M35W-144-0071 |
|--|---------------|
| 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} | 36.6 kJ/°C |

LIFETIME CHARACTERISTICS

| Type | M35W-144-0071 |
|---|------------------|
| 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-144-0071 |
|---|---------------------------------------|
| 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)

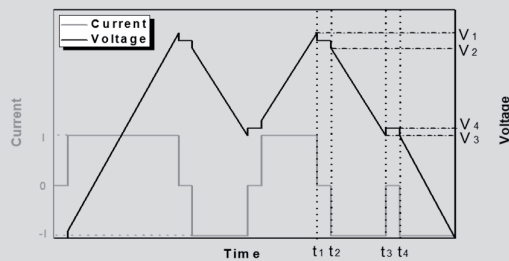
| | |
|--|---|
| Type | M35W-144-0071 |
| Connector | Phoenix MCV1.5/8-GF-3.81 |
| Auxiliary power supply | 24V ± 10% 5W |
| Cell Voltage Monitoring and Management ¹⁹ | Microprocessor based, individual cell balancing |
| Temperature Sensor | 4x NTC (10kOhm @25°C) |
| Communication interface | CAN bus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

PHYSICAL PARAMETERS

| | |
|---------------------------------|------------------|
| Type | M35W-144-0071 |
| Mass M, typical | 32.6 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 V_R after 72 h is the leakage current.
Leakage current may be greater if balancing is activated.
- 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 15Nm 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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