

# **BMS Offline Simulation Report — GREATPOWER**

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Params: data/params\_rack\_greatpower.yaml

Scenarios: data/scenarios\_greatpower.yaml

Contents:

- 1) Rack & BMS configuration summary
- 2) Scenario test plan (IDs + descriptions)
- 3) Results: metrics + plots per scenario

Field	Value
Active profile	GREATPOWER
Params YAML	data/params Rack GREATPOWER.yaml
Scenarios YAML	data/scenarios GREATPOWER.yaml
Extracted directly from the active params YAML used in simulations.	
Structure: packs_in_series_per_rack	4
Structure: cells_in_series_per_pack	104
Derived: n_series_cells	416
Electrical: q_nom_ah	280.0
Electrical: r0_ohm	0.09
Electrical: r1_ohm / c1_f	0.03 / 8000.0
Electrical: r2_ohm / c2_f	0.015 / 25000.0
Limits: i_discharge_max_a	320.0
Limits: i_charge_max_a	320.0
Limits: v_cell_min_v / v_cell_max_v	2.6 / 3.6
Limits: t_min_c / t_max_c	-30.0 / 60.0
BMS: soc_low_cutoff / start	0.05 / 0.1
BMS: soc_high_cutoff / start	0.95 / 0.9
BMS: t_low_cutoff_c / start (legacy)	-30.0 / 0.0
BMS: t_low_cutoff_discharge_c / start	-30.0 / 0.0
BMS: t_low_cutoff_charge_c / start	0.0 / 10.0
BMS: t_high_cutoff_c / start	60.0 / 50.0
BMS: v_margin_v (or split)	0.05 (low=0.05, high=0.05)
Thermal: c_th_j_per_k	3000000.0
Thermal: r_th_k_per_w	0.015
Thermal: t_init_c	25.0
Faults: ov_cell_v / uv_cell_v	3.65 / 2.5
Faults: ot_rack_c / ut_rack_c	60.0 / -30.0
Faults: oc_discharge_a / oc_charge_a	360.0 / 360.0

# Scenario Test Plan

Scenarios executed in this report.

Field	Value
GP_S1_nominal_25C_1C	Nominal 1C (280A) discharge at 25°C with BMS current limitation.
GP_S2_nominal_0C_1C	Nominal 1C (280A) discharge at 0°C ambient.
GP_S3_nominal_-10C_0p5C	Cold discharge at -10°C, 0.5C (140A). Used to validate temperature derating /
GP_S4_charge_25C_0p5C	Charge at 25°C, 0.5C (140A).
GP_S5_uv_fault_injection	Under-voltage fault (deterministic injection) during discharge at 25°C.
GP_S6_ov_fault_injection	Over-voltage fault (deterministic injection) during charge at 25°C.
GP_S7_ot_fault_injection	Over-temperature fault (deterministic injection) at 25°C.
GP_S8_oc_fault_injection	Over-current fault (deterministic injection) at 25°C.
GP_S9_fire_gas_alarm_injection	Fire/Gas alarm pathway test (injected gas_alarm at t=1200s)
GP_S10_ekf_convergence_mismatch	EKF convergence demo: true SoC differs from EKF initial SoC.
GP_S11_voltage_window_derate_demo	Voltage-window derating demonstration (starts near upper region).
GP_S12_peak_25C_320A_5min	Peak discharge current capability test: 320 A for 5 minutes (300 s) at 25°C (BM
GP_S13_charge_0C_cutoff	Charge at 0°C to verify CHARGE low-temp cutoff (expected i <sub>act</sub> ~ 0 A due to t
GP_S14_charge_5C_derate_demo	Charge at 5°C to verify linear derate for charge (expected ~50% temp scale be