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48V 100Ah LiFePO4 BMS DESIGN DOCUMENT

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► SECTION 1: SYSTEM SPECIFICATIONS

• Battery: 15S LiFePO4 (48V nominal)

• Capacity: 100Ah (3.2V per cell)

• Max Discharge: 940A (45kW)

• Max Charge: 460A (22kW)

► SECTION 2: SCHEMATIC DIAGRAM

[Insert Hand-Drawn or KiCad Schematic Here]

• Key Components:

- BQ76952 (AFE)

- INA240 (Current Sensor)

- 6x C3M0065090D MOSFETs

► SECTION 3: BILL OF MATERIALS (BOM)

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│ Ref Des │ Qty │ Component │ DigiKey PN │

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│ U1 │ 1 │ BQ76952 │ 296-46891-ND│

│ Q1-Q6 │ 6 │ C3M0065090D │ 785-1312-ND │

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► SECTION 4: STEP-BY-STEP BUILD GUIDE

1. PCB Assembly:

- Solder BQ76952 first (300°C hot air)

- Install 50μΩ shunt resistor

- Mount MOSFET array last

2. Wiring:

• VC0 → Battery negative

• VC1 → Cell1+ (3.2V)

• INA240 IN+ → Shunt+

► SECTION 5: FIRMWARE CODE (STM32)

▼ Current Reading Function ▼

float read\_current() {

HAL\_ADC\_Start(&hadc1);

uint32\_t raw = HAL\_ADC\_GetValue(&hadc1);

return (raw \* 0.00005) / 50e-6; // 50μΩ scaling

}

► SECTION 6: TEST PROCEDURES

1. Voltage Calibration:

- Apply 3.200V to Cell1 → Adjust BQ76952 register

2. OVP Test:

- Raise voltage to 3.65V → Verify cutoff

► SECTION 7: TROUBLESHOOTING

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│ Symptom │ Solution │

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│ No cell readings│ Check I2C pull-ups │

│ MOSFETs overheating │ Verify gate drive │

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