Benchmarq Products
from Texas Instruments

DM2382

Gas Gauge Peripheral and Li-Ion Pack Protection Demonstration Board

Features

- Compact gas gauge peripheral and protection solution for 1-cell Li-Ion batteries
- Accurate counting of charge, discharge, and self-discharge counts and time
- Single-wire HDQ interface for communicating battery and other information
- Overvoltage, undervoltage, overcurrent, and thermal protection for a single Li-Ion cell
- Integrated protection FET
- EV2200-18 interface capability for easy evaluation
- Small size: 40mm x 6mm x 2mm

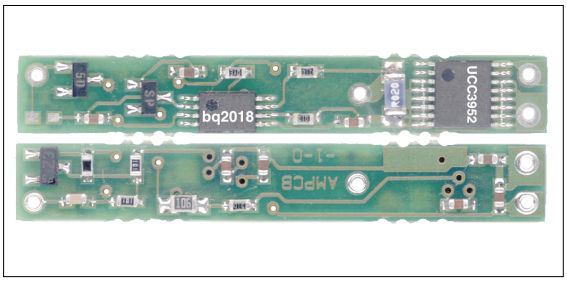
General Description

The DM2382 integrates the bq2018 gas gauge peripheral and the UCC3952 single-cell Li-Ion protection device into a complete solution for battery-pack integration.

Gas Gauging

The bq2018 is a low-cost charge/discharge counter. It works with an intelligent host controller, providing state-of-charge information for rechargeable batteries, in this case a Li-Ion rechargeable cell. The bq2018 measures the voltage drop across a low-value series sense resistor between the negative terminal of the battery and the battery-pack ground contact. By using the accumulated counts in the charge, discharge, and self-discharge registers, an intelligent host controller can determine battery state-of-charge information. To improve accuracy, an offset count register is available. The system host controller resets the charge in/out and self-discharge registers as needed.

The bq2018 also features 128 bytes of NVRAM registers. The upper 13 bytes of NVRAM contain the capacity monitoring and status information. The RBI (register backup input) operates from an external power-storage source such as a capacitor or a series cell in the battery pack, providing register nonvolatility while the battery is shorted to ground or when the battery charge is not sufficient to operate the bq2018. In this mode, the register backup current is less than 100nA.



Cell Protection

The UCC3952 is a monolithic BiCMOS Li-Ion battery protection circuit that increases the useful operating life of a one-cell rechargeable battery pack. Cell-protection features consist of internally trimmed charge and discharge voltage limits, discharge current limit with a delayed shutdown, and an ultra-low-current sleep mode when the cell is discharged. Additional features include an on-chip MOSFET for reduced external component count and a charge pump for reduced power losses while charging or discharging a battery pack with low cell-voltage. This protection circuit requires one external capacitor and can operate and safely shut down in the presence of a short circuit.

For full details on the bq2018 and the UCC3952, see the individual IC data sheets.

Pin Descriptions

P1 **Pack+/Cell+ terminal**

Connection for the battery pack and the positive terminal of the Li-Ion cell

P2 **Cell– terminal**

Negative terminal of the Li-Ion cell

P3 **Pack– terminal**

Negative terminal of the battery pack

P4 **HDQ serial interface port**

Bi-directional input/output port for communicationg register information to the host system

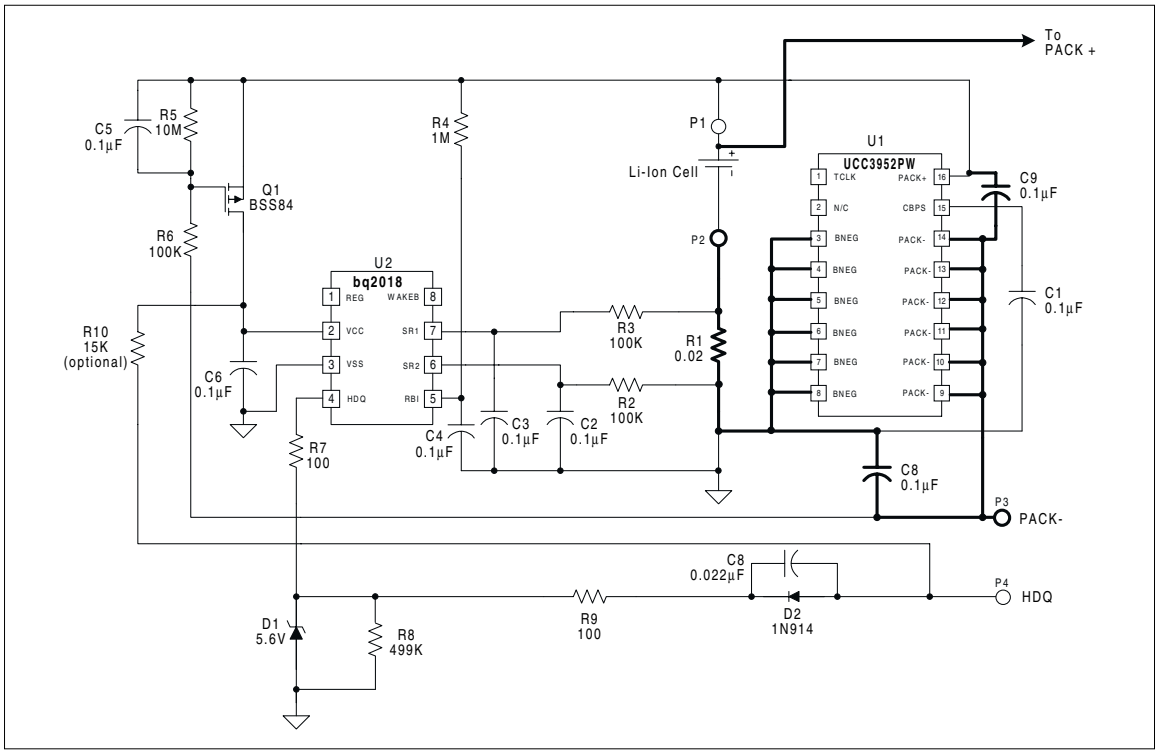


Figure 1. DM2382 Circuit Diagram

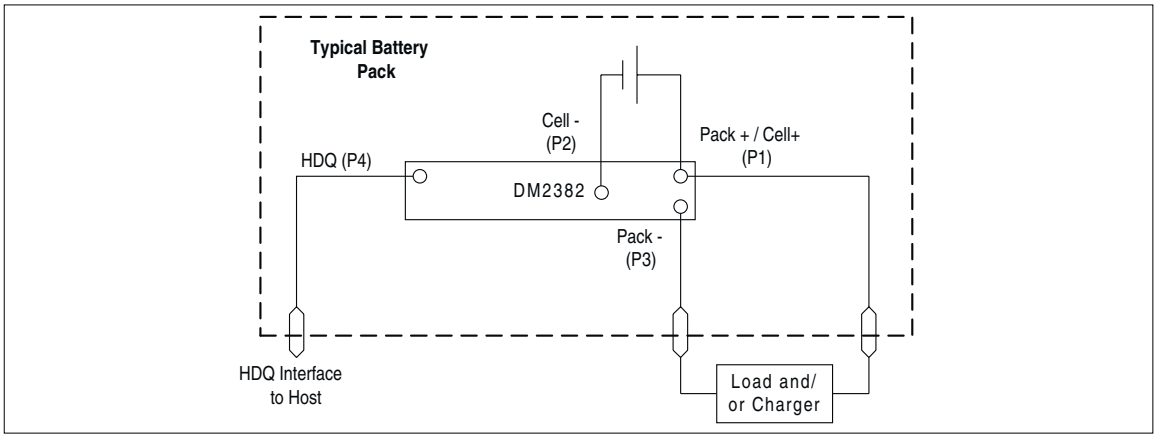


Figure 2. DM2382 Connection Diagram

Absolute Maximum Ratings

Symbol	Parameter	Minimum	Maximum	Unit	Notes
V_{CHG}	Charging voltage	-	16	V	Pack+ to Pack–
V_{SUPPLY}	Supply voltage	-	7	V	Pack+ to Cell–
I_{CHG}	Charging current	-	3	A	Continuous
T_{OPR}	Operating temperature	0	70	°C	
T_{STG}	Storage temperature	- 40	125	°C	

Note: Permanent device damage may occur if **Absolute Maximum Ratings** are exceeded. Functional operation should be limited to the Recommended DC Operating Conditions detailed in this data sheet. Exposure to conditions beyond the operational limits for extended periods of time may affect device reliability.

DC Thresholds

Symbol	Parameter	Minimum	Typical	Maximum	Unit	Notes
V_{OV}	Overvoltage	4.20	4.25	4.30	V	UCC3952-2
V_{OVR}	Overvoltage recovery	3.90	3.95	4.00	V	UCC3952-2
V_{UV}	Undervoltage	2.25	2.35	2.45	V	UCC3952-2
V_{UVR}	Undervoltage recovery	2.55	2.65	2.75	V	UCC3952-2
T_S	Thermal shutdown	-	135	-	°C	Not 100% tested

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