NXP Communicator

Introducing NXP's

MC33771B

MC33771B: 14-Channel Li-ion Battery Cell Controller IC and

1 Product Summary

The 33771B is a SMARTMOS lithium-ion battery cell controller IC designed for automotive applications, such as hybrid electric (HEV) and electric vehicles (EV) along with industrial applications, such as energy storage systems (ESS) and uninterruptible power supply

(UPS) systems.

The device performs ADC conversions of the differential cell voltages and current, as well as battery coulomb counting and battery temperature measurements. The information is digitally transmitted through the SPI or transformer isolation to a microcontroller for processing.
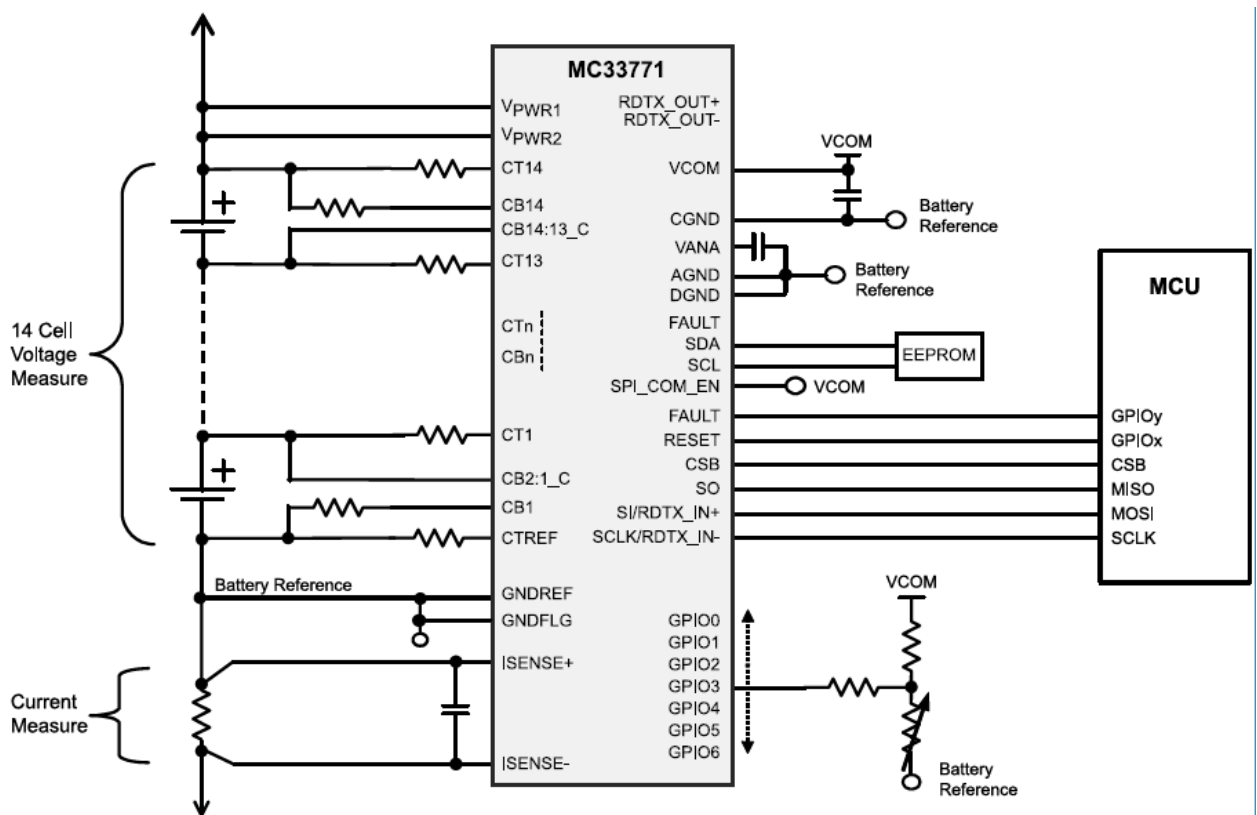
Figure 1. Simplified application diagram, SPI use case

2 Specification Highlights

- Battery Topology Flexibility
    - Scalable SW & HW BMS solution supporting 7 to 210 cells per daisy chain
    - Supporting Centralized, Distributed Daisy Chain, Distributed CAN
- High Integration
    - Integrated Power Supply
    - Integrated Balancing FETs (300mA) w/ dedicated timer for each FET, programmable up to 8 hours
    - Integrated current Sensor (+-1500A,) 0.5% accuracy with Coulomb Counter
    - Multiple programmable wake-up modes to support low-power operating mode
    - One Chip AFE for 48V Li-ion BMS
- Highly Synchronized Data Acquisition and Fast Communication
    - Only 3.6 ms for pack controller to acquire conversions for 96 cells
    - All cell voltages and currents within same daisy chain measured within 100us
- Superior Daisy Chain Communication
    - 2Mbps, 100% differential, programmable address, bus wake-up
    - 3750V Isolation with AEC-Q200 qualified external transformers
    - Automatic termination resistors, Common Mode Noise Immunity,
    - Receiver BCI tested (>200mA)
    - Transformer AECQ-200 Qualified
- System Diagnostics and functional safety supporting ISO2626, single chip ASIL C capable, up to ASIL D safety capability
- Automotive robustness: ESD, EMC, Hot Plug, AEC-Q 100
- Ultra-low radiated emissions

3 Target Applications

- **Automotive Applications**
    - High-voltage battery management systems (> 800V)
    - 48 V battery management systems
- **Industrial Applications**
    - Energy storage systems (ESS)
    - Uninterrupted power supply (UPS)
    - E-bikes, E-scooters

4 Product Specifications

Feature / Requirement	MC33771B
Operating Voltage	9.6V … 61.6V
Transient Voltage	75V
Power supply	Integrated
TPL Communication Bit Rate	2 Mbps
SPI Frequency	4 MHz
# Cell Voltages (±0.8mV)	14
# Balancing FETs (300mA per channel)	14
# Balancing timers (up to 8hrs, per channel)	14
# Current Sensor w/ PGA	1
# Coulomb Counter	1
# Temperature Inputs /GPIOs	7
Time needed to acquire all 14 cell voltages and the current after an on-demand conversion (16-bit resolution)	208 µs
V/I Synchronization Time (16-bit resolution)	113 µs
Operation Temperature Range	-40 ~105 °C
Package	64 LQFP-EP

5 DEVELOPMENT TOOLS

The MC33771B development kits provide an evaluation platform for designing battery management applications using our MC33771B is a Li-Ion battery cell controller IC

Easy to Use tools: Fast Evaluation of Device performance

Part Number	Description
FRDM33771BSPIEVB	Evaluation board, MC33771B- Battery cell controller IC using SPI
FRDM33771BTPLEVB	Evaluation board, MC33771B- Battery cell controller IC using TPL
BATT-14AAAPACK	Configurable Battery Pack to supply the MC33771/MC33772 EVB's
See the MC33664 or the MC33772B for additional enablement tools.	

7 SUGGESTED STOCKING

All silicon part numbers are available for ordering today. A full list of orderable part numbers can be found in the distributor price-book. Superset part numbers are available for stocking and orders can be placed immediately.

"Development boards" are included in Price Book. Those devices highlighted below are highest priority for stocking based on anticipated popularity.

Part Number	12NC	Product Family
MC33771BSP1AE	935349661557	MC33771
MC33771BSP1AER2	935349661528	MC33771
MC33771BTP1AE	935350893557	MC33771
MC33771BTP1AER2	935350893528	MC33771
MC33771BSA1AE	935349742557	MC33771
MC33771BSA1AER2	935349742528	MC33771
MC33771BTA1AE	935350632557	MC33771
MC33771BTA1AER2	935350632528	MC33771
MC33771BSP2AE	935349658557	MC33771
MC33771BSP2AER2	935349658528	MC33771
MC33771BTP2AE	935350622557	MC33771
MC33771BTP2AER2	935350622528	MC33771
MC33771BSA2AE	935350994557	MC33771
MC33771BSA2AER2	935350994528	MC33771
MC33771BTA2AE	935350619557	MC33771
MC33771BTA2AER2	935350619528	MC33771

MC33771BTB1AE	935350626557	MC33771
MC33771BTB1AER2	935350626528	MC33771

8 EXPORT COMPLIANCE

NXP Semiconductors makes product Export Control Classification Number (ECCN) and Harmonized Tariff Schedule (HTS) classifications available for informational purposes only and the classifications are subject to change without notice. Anyone importing or exporting/re-exporting an NXP item is solely responsible for assuring the ECCN and HTS they use is correct. Further, NXP does not provide guidance regarding the exportability of its products, software or technology. Such questions should be directed to the exporter's internal Trade Compliance organization or legal counsel.

NXP Product Number	USHTS	ECCN	CCATS #	ENC Status	U.S. EAR - Regulatory Reference
See parts list above	8542.39.0000	EAR99			

The extended ECCN for all of our 5A002 devices is both a.1.a and a.1.b since we have both symmetric and asymmetric algorithms in all of our encrypted products.

9 AVAILABLE DOCUMENTATION

Include direct links to high value assets as well as links to NXP.com, disty extranet and channel launch repository.

Links to distributor extranet:
https://nxp1.sharepoint.com/teams/ext96/SitePages/AAA%20Energy%20and%20Power%20Management.aspx

Links to NXP.com: www.nxp.com/MC33771

Link to Datasheet(s) : Short datasheet available on NXP.com

Full Datasheet to be shared under NDA per request