NXP Communicator
Introducing NXP's
MC33772B

MC33772B: 6-Channel Li-ion Battery Cell Controller IC

1 Product Summary

The 33772B 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.
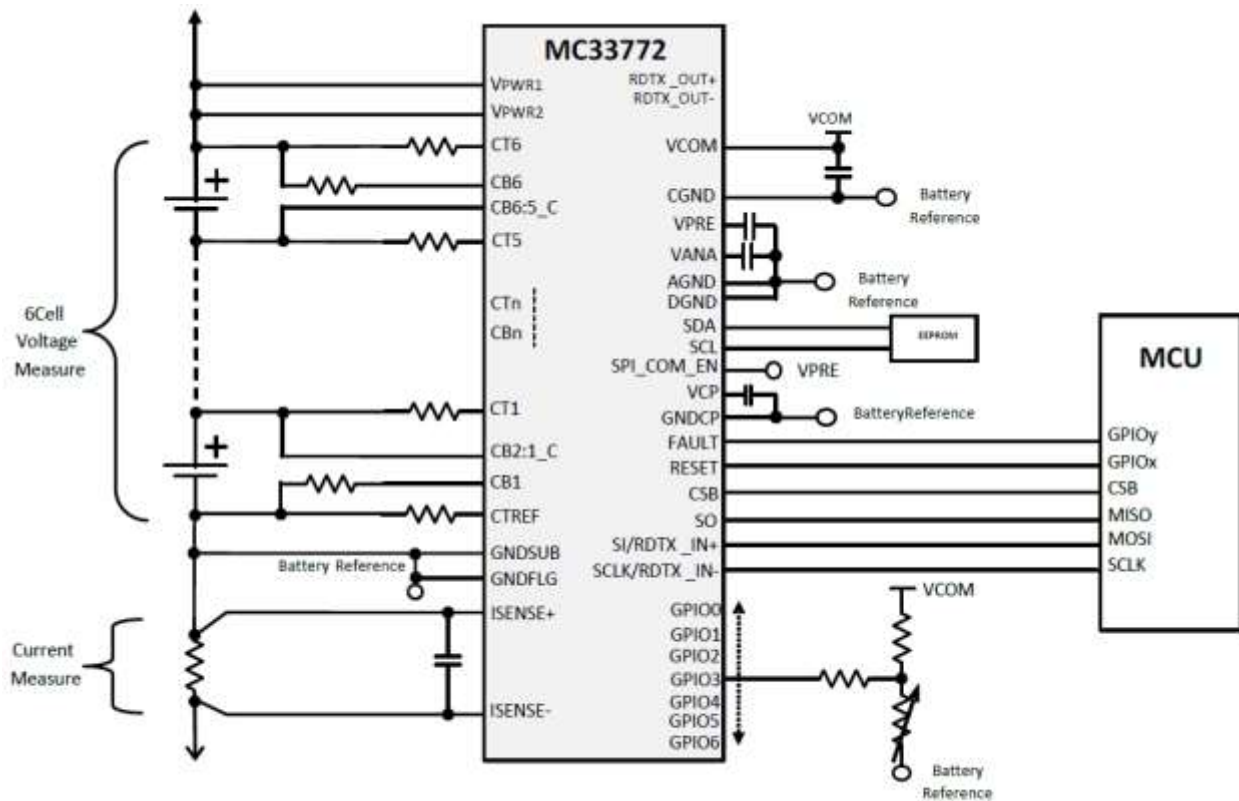

Figure 1.   Simplified application diagram, SPI use case

2 Specification Highlights

- Battery Topology Flexibility
  - Scalable SW & HW BMS solution supporting 3 to 90 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 14V Li-ion BMS
- Highly Synchronized Data Acquisition and Fast Communication
  - All cell voltages and currents within same daisy chain measured within 100us
- Superior Daisy Chain Communication
  - 2 Mbps, 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)
  - 14 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	5V … 30V (SPI) 7V … 30V (TPL)
Transient Voltage	42V
Power supply	Integrated
TPL Communication Bit Rate	2 Mbps
SPI Frequency	4 MHz
# Cell Voltages (±0.8mV)	6
# Balancing FETs (300mA per channel)	6
# Balancing timers (up to 8hrs, per channel)	6
# Current Sensor w/ PGA	1
# Coulomb Counter	1
# Temperature Inputs /GPIOs	7
Time needed to acquire all 6 cell voltages and the current after an on-demand conversion (16-bit resolution)	152 μs
V/I Synchronization Time (16-bit resolution)	88 μs
Operation Temperature Range	-40 ~105 °C
Package	48 LQFP-EP

5 DEVELOPMENT TOOLS

The MC33772B development kits provide an evaluation platform for designing Battery applications using our MC33772B is a Li-Ion battery cell controller IC

Easy to Use tools: Fast Evaluation of Device performance

Part Number	Description
FRDM33772BSPIEVB	Evaluation board, MC33772B- Battery cell controller IC using SPI
FRDM33772BTPLEVB	Evaluation board, MC33772B- Battery cell controller IC using TPL
BATT-14AAAPACK	Configurable Battery Pack to supply the MC33771B / MC33772B EVB's
See the MC33664 or the MC33771B 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
MC33772BSP1AE	935358985557	MC33772
MC33772BSP1AER2	935358985528	MC33772
MC33772BTP1AE	935359123557	MC33772
MC33772BTP1AER2	935359123528	MC33772
MC33772BSA1AE	935358981557	MC33772
MC33772BSA1AER2	935358981528	MC33772
MC33772BTA1AE	935359127557	MC33772
MC33772BTA1AER2	935359127528	MC33772
MC33772BSP2AE	935358987557	MC33772
MC33772BSP2AER2	935358987528	MC33772
MC33772BTP2AE	935359125557	MC33772
MC33772BTP2AER2	935359125528	MC33772
MC33772BSA2AE	935358983557	MC33772
MC33772BSA2AER2	935358983528	MC33772
MC33772BTA2AE	935359129557	MC33772
MC33772BTA2AER2	935359129528	MC33772
MC33772BTC0AE	935363206557	MC33772
MC33772BTC0AER2	935363206528	MC33772

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/MC33772

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

     Full datasheet to be shared under NDA per request

*Please note that the Channel Launch Repository is for marketing assets like high res block diagram and board photography. This same information is also posted to the "product" launch folder on the distributor extranet for others outside of marketing who may need it.