



Analog Solutions—Robust Reliable Performance

MC33771 and MC33664

Battery Cell Controller and Transformer Physical Layer

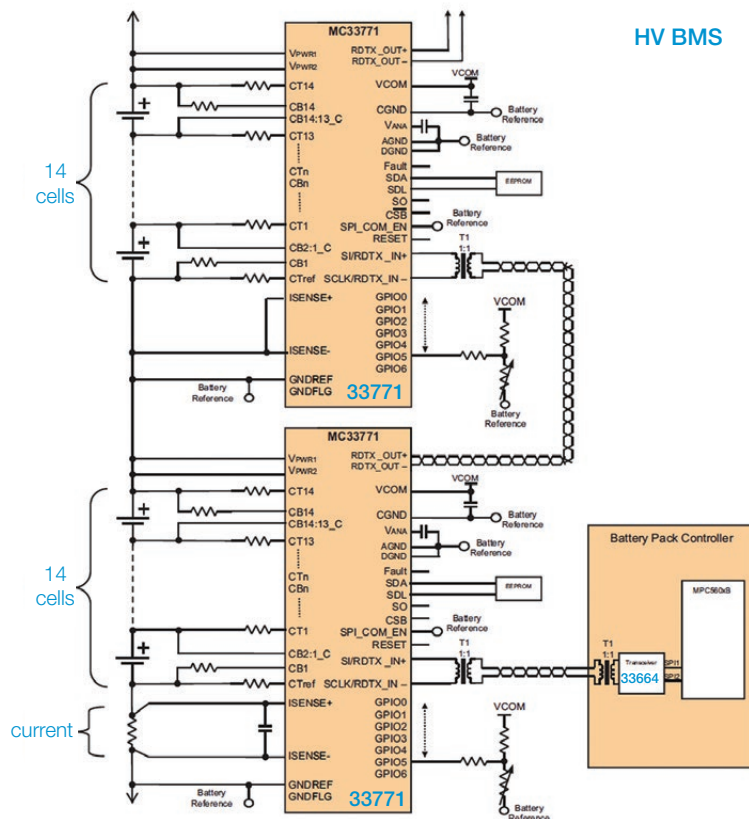
Overview

Freescale's MC33664 transformer physical layer and MC33771 battery cell controller solution enables reliable, safe and bill of materials (BOM) optimized Li-ion cell control applications with low-cost, robust, high-speed isolated communication. These fully integrated battery monitoring devices are for automotive and industrial mission critical applications. Battery topology flexibility is supported with compatibility including 48 V batteries with one analog front end (AFE).

High speed and robust daisy chain is used as an alternative to CAN solutions. Fast data acquisition and communication to the pack controller can be achieved in only 2.6 ms for the pack controller to acquire conversions from 96 cells. Also, determination of individual cell impedances in one shot is synchronized for cell voltages and current measurements within 65 us.

With functional verification and diagnostics, the MC33664 and MC33771 support ISO 26262 SafeAssure functional safety. Functional verification of cell measure, current measure, cell terminal openings or leakage and ADC precision checks are all performed.

MC33771 and MC33664 High-Voltage Battery Management System



Automotive Applications

- High-voltage battery management systems (> 800 V)
- 48 V battery management systems

Industrial Applications

- Energy storage systems (ESS)
- Uninterrupted power supply (UPS)
- E-bikes, E-scooters



MC33664 and MC33771 Product Differentiation

Features	Benefits
Integrated current channel and Coulomb counting	Reduces BOM for 48 V battery applications (only one AFE required)
Integrated current channel synchronized with cell voltage measurements	Determination of individual cell impedances in one shot for improved SoC/SoH prediction
Optional high speed isolated or SPI communication	Addresses all existing battery management system topologies (centralized, distributed daisy chain, distributed CAN)
High speed (2 Mbps) isolated high speed differential communication	Allows BOM cost reduction by transition from CAN to daisy chain without compromise on communication speed
Fast data acquisition and communication to pack controller	Determination of individual cell impedances in one shot, synchronized cell voltages and current measurements within 65 μ s
Robust against hot plug and random cell connection	No pre-damaging of cell and no damaging of devices during customer battery/electronics assembly
ESD/EMC robustness	ESD/EMC robustness avoids external components for robustness protection (BOM reduction, board space reduction)
Supports ISO 26262 SafeAssure functional safety with single package solution	Has functional verification and diagnostics
Low-level drivers	Simplifies software development and reduces switching cost

Features

- $9.6\text{ V} \leq \text{VPWR} \leq 61.6\text{ V}$ operation, 70 V transient
- SPI or Isolated 2 MHz differential communication
- 14x differential cells voltage and stack voltage measurements
- Synchronized cell voltage/current measurement with Coulomb counting
- 7x ADC/GPIO/temperature sensor inputs
- Addressable on initialization
- Onboard 300 mA passive cell balancing
- Low-power modes
- 64-pin QFP package

Documentation

Freescall Document Number	Title	Description
MC33771	Battery Cell Controller	Data Sheet
MC33664	Transformer Physical Layer	Data Sheet
SG1002	Analog Product Selector Guide	Selector Guide
SG187	Automotive Product Selector Guide	Selector Guide
SG200	Industrial Product Selector Guide	Selector Guide

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Expanding on more than 30 years of innovation, Freescall is a leading provider of high-performance products that use SMARTMOS technology combining digital, power and standard analog functions. Freescall supplies analog and power management ICs that are advancing the automotive, consumer, industrial and networking markets. Analog solutions interface with real world signals to control and drive for complete embedded systems.



For more information visit freescall.com/battery



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Document Number: MC33664FS REV 1

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