

Dear customer

LAPIS Semiconductor Co., Ltd. ("LAPIS Semiconductor"), on the 1st day of October, 2020, implemented the incorporation-type company split (shinsetsu-bunkatsu) in which LAPIS established a new company, LAPIS Technology Co., Ltd. ("LAPIS Technology") and LAPIS Technology succeeded LAPIS Semiconductor's LSI business.

Therefore, all references to "LAPIS Semiconductor Co., Ltd.", "LAPIS Semiconductor" and/or "LAPIS" in this document shall be replaced with "LAPIS Technology Co., Ltd."

Furthermore, there are no changes to the documents relating to our products other than the company name, the company trademark, logo, etc.

Thank you for your understanding.

LAPIS Technology Co., Ltd.
October 1, 2020

Li-ion Battery Monitoring LSI With High-side NMOS FET driver

ML5236

LSI

Product Overview

The ML5236 is an analog-front-end LSI that measures up to 14 series-connected battery cells for battery management and protection system of Li-ion secondary battery pack. With an external micro-controller LSI, it supports voltage monitoring of each battery cell, current monitoring at charging and discharging, and temperature monitoring.

The ML5236 also has the protection function that automatically cut off an external High-side NMOS FET at short current or over-charge voltage, without any control by external micro-controller LSI.



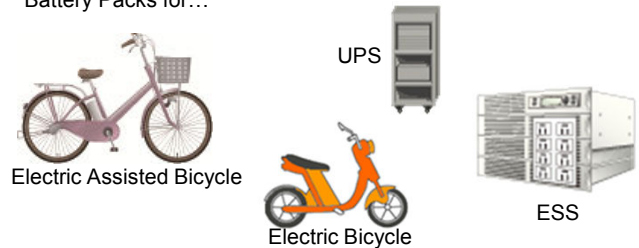
44-pin plastic TQFP

Features

- 5 to 14-cells high accuracy cell voltage monitoring
- Charging and discharging current monitoring
- Short current detection
- Cell-balancing with on-chip FET switches
- High-side NMOS FET switches
- Temperature sensor monitoring
- Secondary protection and WDT on-chip
- Built-in 3.3V regulator for driving external MCU
- Low power consumption
- Serial Peripheral Interface mode 0 is supported with CRC (Cycle Redundancy Code) and 3.3V/5V interface

Applications

Battery Packs for...



Major Specifications

Number of cells	5 to 14 series cells
Power supply voltage	+8V to +64V
Voltage monitor accuracy	12-bit ADC +/- 10mV(typ.) at $V_{CEL}=4.0V$
Current monitor	12-bit ADC, for common use On-chip current monitoring amplifier x12 or x60, selected by register
Short current detection	Differential voltage between ISP-ISM pin 50mV/100mV/150mV/200mV Detection delay time is set with external capacitor
Cell-balancing	Built-in cell balancing switches, controlled by register setting. ON resistance is 6-Ohm(typ.)
Charge/discharge control	On-chip NMOS FET driver for external NMOS High-side switches.
Temperature sensor monitoring	2-ports for thermistor connection pin
2 nd protection and WDT	Overcharge protection compared with threshold register for overcharge detection For self diagnosis in communication interface, overflow setting of interval timer is available.
3.3V regulator for driven external MCU	Output current : 10mA max. Current boost by an external PMOS FET
Power consumption	500 μA (typ.) at Normal operation mode 100 μA (typ.) at Power-save mode 0.1 μA (typ.) at Power-down mode
Operating temperature	-40 °C to +85 °C
Package	44-pin plastic TQFP (P-TQFP44-1010-0.80-TK6)

Application Example

7-series connected battery cells, MCU with 5V

