MinebeaMitsumi
Passion to Create Value through Difference

Voltage Monitor IC for Li-ion Cell Balance

MM3513 Series

Description

The MM3513 series are voltage monitor ICs for rechargeable Lithium-ion or Lithium-polymer batteries, using a high voltage CMOS process. Each Lithium-ion or Lithium-polymer battery can be balanced. Each of these ICs is composed of voltage detectors, reference voltage sources, an oscillator, a counter circuit and logical circuits.

Features
(Unless otherwise specified, Ta=25 degC)

・Detection voltage	Range	Accuracy
Detection voltage	3.5V to 4.5V, 5mV steps	+/-20mV
Hysteresis voltage	0V to 0.4V, 50mV steps	
	However,"Detection voltage-Hysteresis voltage<3.5V" is disabled.	

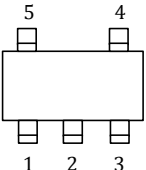| ・Current consumption at Ta=25 degC		
Normal mode	1.5uA typ.	3.0uA max.
Standby mode	0.5uA max.	

Applications
・Lithium-ion rechargeable battery pack
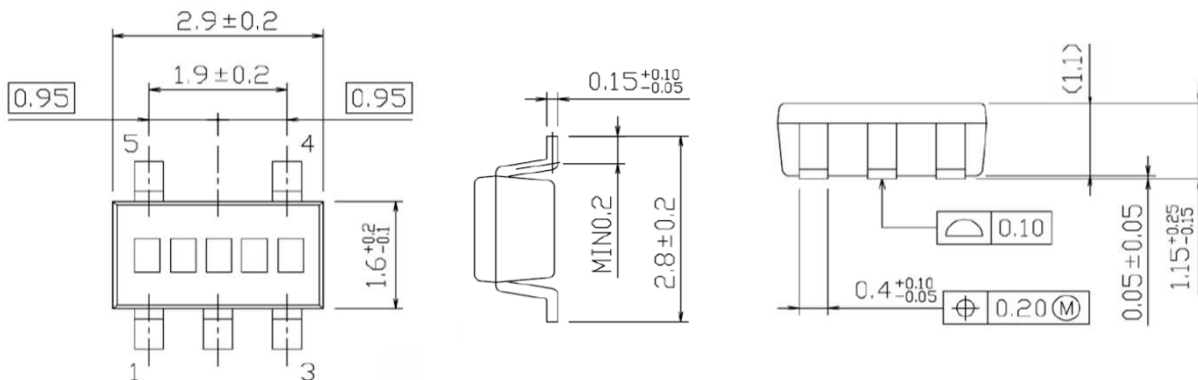・Lithium polymer rechargeable battery pack

Package type
・SOT-25A   2.80 × 2.90 × 1.15 [mm]

Package and pin configuration

SON-6F	Pin No.	Symbol	Function
	1	NC	No connection
	2	VDD	VDD terminal. Connected to IC substrait
	3	VSS	VSS terminal. Connected to ground
	4	DS	Delay shorten terminal
	5	OUT	Output of detecting voltage. Output type is CMOS

Package dimensions

・SOT-25A

Absolute maximum ratings

Parameter	Symbol	Rating	Unit
Supply voltage	VDD	-0.3 to 12	V
DS terminal	VDS	VSS-0.3 to VDD+0.3	V
OUT terminal	VOUT	VSS-0.3 to VDD+0.3	V
Storage temperature	Tstg	-55 to +125	degC

Recommend operating conditions

Parameter	Symbol	Rating	Unit
Operating ambient temperature	Topr	-40 to +85	degC
Operating voltage	Vop	1.5 to 5.5	V

Electrical characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input voltage and Output voltage						
Operating input voltage	VDD1	VDD-VSS	1.5	-	5.5	V
Standby mode change voltage	Vsta		2.9	3.0	3.1	V
OUT pin Nch ON voltage	Vol	Iol=30uA, VDD=3.4V	-	0.4	0.5	V
OUT pin Pch ON voltage	Voh	Ioh=-30uA, VDD=4.5V	3.9	4.3	-	V
Current consumption						
Current consumption	Idd	VDD=3.4V	-	1.5	3.0	uA
Current consumption at stand-by	Is	VDD=2.0V	-	0.2	0.5	uA
Detection voltage						
Detection voltage	Vdet	Ta=+25degC	Typ-0.020	Vdet1	Typ+0.020	V
		Ta=-5～+60drgC	Typ-0.025		Typ+0.025	
Detection delay time						
Detection delay time	tVdet	VDD=3.4V→4.6V	Typ*0.8	tVdet1	Typ*1.2	s

Typical application circuit

5cell typical application
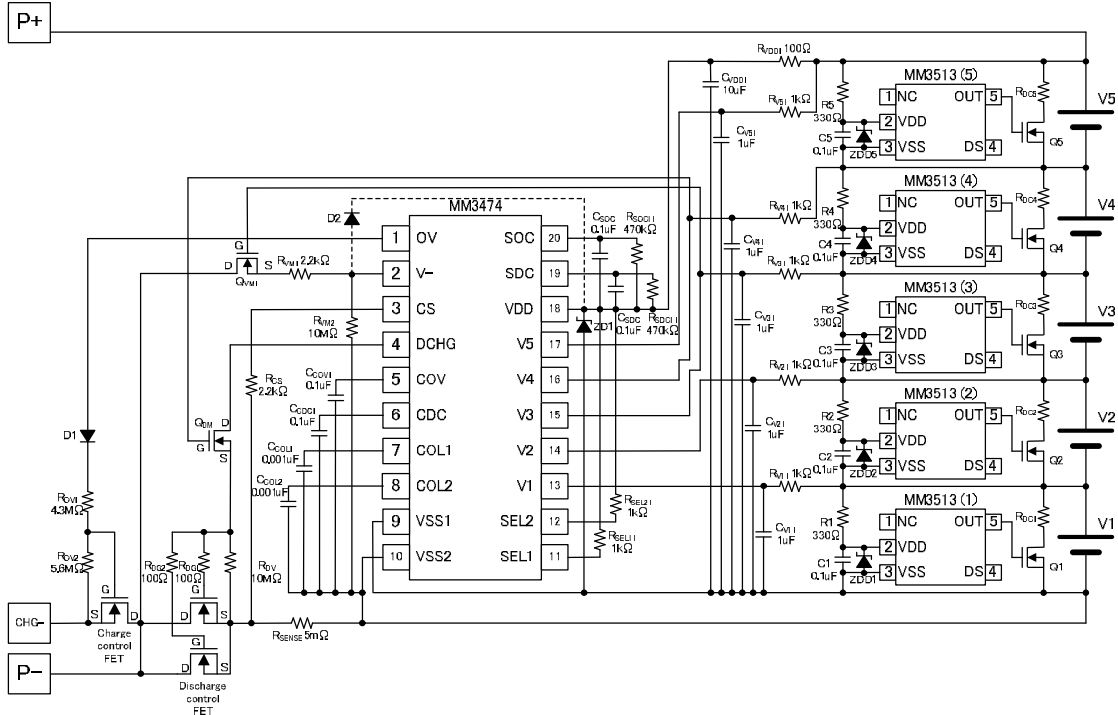
Application hints

- Resistors R1 to R5 and capacitors C1 to C5 stabilize a supply voltage ripple. However, if the resistors R1 to R5 are increased, the detection voltage raises due to through-current in the IC. Therefore, adjust the value to 1k ohm or less. Moreover, the capacitors C1 to C5 should be 0.01uF or more to ensure stable operation.

- For resistors RDC1 to RDC5, the value of bypass current is determined.

Lineup

Product name (MM3513)	Detection voltage	Hysteresis voltage	Detection delay time	Release delay time
	V	V	sec	ms
A01NRH	4.150	0.010	0.25	8.0
B01NRH	3.750	0.010	0.25	8.0
C01NRH	4.200	0.010	0.25	8.0
D01NRH	3.600	0.010	0.25	8.0
D02NRH	3.600	0.100	0.25	8.0
F01NRH	3.650	0.010	0.25	8.0
H01NRH	4.175	0.010	0.25	8.0
J01NRH	3.475	0.010	0.25	8.0
K01NRH	4.180	0.010	0.25	4000.0
L01NRH	4.175	0.000	0.25	4000.0
R01NRH	4.210	0.010	0.25	8.0

NOTES

【Safety Precautions】

- Though Mitsumi Electric Co., Ltd. (hereinafter referred to as "Mitsumi") works continually to improve our product's quality and reliability, semiconductor products may generally malfunction or fail. Customers are responsible for complying with safety standards and for providing adequate designs and safeguards for their hardware, software and systems which minimize risk and avoid situations in which a malfunction or failure of this product could cause loss of human life, bodily injury, or damage to property, including data loss or corruption. Before customers use this product, create designs including this product, or incorporate this product into their own applications, customers must also refer to and comply with (a) the latest versions or all of our relevant information, including without limitation, product specifications, data sheets and application notes for this product and (b) the user's manual, handling instructions or all relevant information for any products which is to be used, or combined with this products. Customers are solely responsible for all aspects of their own product design or applications, including but not limited to (a) determining the appropriateness of the use of this product in such design or applications; (b) evaluating and determining the applicability of any information contained in this document, or in charts, diagrams, programs, algorithms, sample application circuits, or any other referenced documents; and (c) validating all operating parameters for such designs and applications. Mitsumi assumes no liability for customers' product design or applications.

- This product is intended for applying to computers, OA units, communication units, instrumentation units, machine tools, industrial robots, AV units, household electrical appliances, and other general electronic units.

【Precautions for Product Liability Act】

- No responsibility is assumed by us for any consequence resulting from any wrong or improper use or operation, etc. of this product.

【ATTENTION】

- This product is designed and manufactured with the intention of normal use in general electronics. No special circumstance as described below is considered for the use of it when it is designed. With this reason, any use and storage under the circumstances below may affect the performance of this product. Prior confirmation of performance and reliability is requested to customers.
    Environment with strong static electricity or electromagnetic wave
    Environment with high temperature or high humidity where dew condensation may occur

- This product is not designed to withstand radioactivity, and must avoid using in a radioactive environment.

- This specification is written in Japanese and English. The English text is faithfully translated into the Japanese. However, if any question arises, Japanese text shall prevail.