

Control of Lithium Ion Batteries Charging Monolithic IC MM1332

Outline

This IC is a high precision constant voltage constant current power source controller for lithium ion batteries serving as power drivers for P-MOS FET. It was developed for use with one to three cell chargers, and the constant current value can be set freely with external resistance. It has a built-in amplifier for detecting low battery voltage. Using this IC enables the easy addition of a lithium ion battery charging function to conventional battery-charging devices.

Features

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| 1. Output voltage (Ta=-20°C+~70°C) | 3Cell : 12.3V/12.6V±150mV
2Cell : 8.2V/8.4V±100mV
1Cell : 4.1V/4.2V±50mV |
| 2. Current consumption | 250µA typ. |
| 3. Constant current output | set by external resistance |
| Current limit (reference voltage) | 0.1V=external resistance×current value |
| 4. Low voltage detection function (LV) | 2.0V/cell |

Package

SOP-8C, SOP-8E (MM1332□F)

*The box represents the output (charging) voltage rank.

Applications

1. For charging lithium ion batteries
2. High-precision
Stable power sources for all types of equipment

Absolute Maximum Ratings (Ta=25°C)

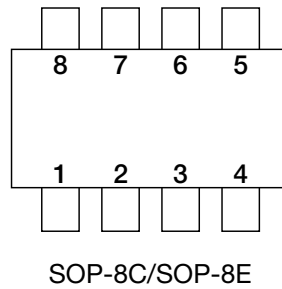
Item	Symbol	Rating	Units
Storage temperature	T _{STG}	-40~+125	°C
Operating temperature	T _{OPR}	-20~+70	°C
Power supply voltage	V _{CC max.}	-0.3~+18	V
Output voltage	V _{O max.}	-0.3~V _{CC}	V
SW input voltage	V _{SW}	-0.3~V _{CC} +0.3	V
Allowable power dissipation	P _d	300	mW

Electrical Characteristics (Unless otherwise specified Ta=25°C, Vcc=5V/CEL)

Item	Symbol	Measurement Conditions	Min	Typ.	Max.	Units
Operating power supply voltage range	V _{CC}		5.0		17.0	V
Current consumption 1	I _{CC1}	V _{SW1} =V _{SW2} =0V (Charge : ON)		250		μA
Current consumption 2	I _{CC2}	V _{SW1} =V _{SW2} =V _{CC} (Charge : OFF)		2		μA
Output voltage	V _O	Ta=-20~+70°C, MM1332A, B, C	4.05	4.10	4.15	V/sell
		Ta=-20~+70°C, MM1332D, E, F	4.15	4.20	4.25	
Current limits	V _{CL}		90	100	110	mV
CEL-CS resistance	R _{CEL}	MM1332A, B, C		820		kΩ/sell
		MM1332D, E, F		840		
SW1 input current	I _{SW1}			20		μA
SW1 input voltage	V _{L1}	Charge : ON	-0.3		2.0	V
	V _{H1}	Charge : OFF	V _{CC} -1.0		V _{CC} +0.3	V
Low-voltage detection voltage	L _V	A~F Rank	1.90	2.00	2.10	V/sell
		G Rank	2.00	2.15	2.30	
SW2 input current	I _{SW2}			20		μA
SW2 input voltage	V _{L2}	Low-voltage detection circuit : ON	-0.3		2.0	V
	V _{H2}	Low-voltage detection circuit : OFF	V _{CC} -1.0		V _{CC} +0.3	V
Low voltage detection output leak current	I _{LV}				0.2	μA
Low voltage detection output saturation voltage	V _{LV}	I _{SINK} =1mA		0.2	0.4	V

- * : MM1332 A : Output voltage 4.1V — for 1cell
- B : Output voltage 8.2V — for 2cell
- C : Output voltage 12.3V — for 3cell
- D : Output voltage 4.2V — for 1cell
- E : Output voltage 4.4V — for 2cell
- F : Output voltage 12.6V — for 3cell
- G : Output voltage available

Pin Assignment Description



Pin No.	Name	I/O	Description
1	SW1	Input	Charging ON/OFF control input pin. SW1=V _{CC} : OFF, SW1=GND : ON Goes OFF when open as it is pulled up to V _{CC} .
2	SW2	Input	Low voltage detection circuit ON/OFF control input pin. SW2=V _{CC} : OFF, SW2=GND : ON Goes OFF when open as it is pulled up to V _{CC} .
3	LV	Output	Low voltage detection circuit output pin. NPN-Tr open collector output; goes ON (low level) for low voltage.
4	GND		Ground pin.
5	CS	Input	Current detection pin. Detects current when external resistor voltage drops and controls current. Reference voltage 0.1V=external resistance × current value
6	CEL	Input	Battery voltage input pin ★ Six types depending on rank : 4.1V, 8.2V, 12.3V, 4.2V, 8.4V, 12.6V, (TYP.)
7	EXT	Output	Constant voltage circuit output pin. Controls external P-MOS FET gate and charges constant voltage.
8	V _{CC}		Power supply input pin.

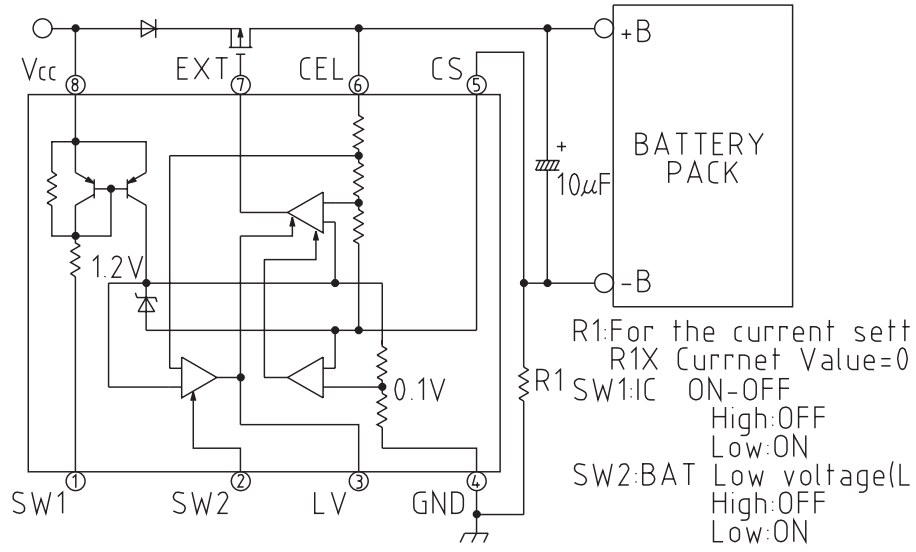
*G : Constant voltage circuit input pin

External resistance ratio (R1 : R2) enables setting constant voltage circuit output voltage.

Low voltage detection voltage is set for one cell (4.1V or 4.2V).

Block Diagram

MM1332A, B, C, D, E, F,



MM1332G

