

# 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

- |  |  |
|--|--|
| 1. Output voltage (Ta=−20°C+~70°C)     | 3Cell : 12.3V/12.6V±150mV<br>2Cell : 8.2V/8.4V±100mV<br>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

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

## Absolute Maximum Ratings (Ta=25°C)

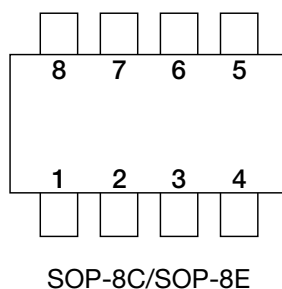
Item	Symbol	Rating	Units
Storage temperature	T <sub>STG</sub>	−40~+125	°C
Operating temperature	T <sub>OPR</sub>	−20~+70	°C
Power supply voltage	V <sub>CC</sub> max.	−0.3~+18	V
Output voltage	V <sub>O</sub> max.	−0.3~V <sub>CC</sub>	V
SW input voltage	V <sub>SW</sub>	−0.3~V <sub>CC</sub> +0.3	V
Allowable power dissipation	P <sub>d</sub>	300	mW

**Electrical Characteristics** (Unless otherwise specified Ta=25°C, V<sub>CC</sub>=5V/CEL)

Item	Symbol	Measurement Conditions		Min	Typ.	Max.	Units
Operating power supply voltage range	V <sub>CC</sub>			5.0		17.0	V
Current consumption 1	I <sub>CC1</sub>	VSW1=VSW2=0V (Charge : ON)			250		μA
Current consumption 2	I <sub>CC2</sub>	VSW1=VSW2=V <sub>CC</sub> (Charge : OFF)			2		μA
Output voltage	V <sub>O</sub>	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 <sub>CL</sub>			90	100	110	mV
CEL-CS resistance	R <sub>CEL</sub>	MM1332A, B, C			820		kΩ/sell
		MM1332D, E, F			840		
SW1 input current	I <sub>SW1</sub>				20		μA
SW1 input voltage	V <sub>L1</sub>	Charge : ON		-0.3		2.0	V
	V <sub>H1</sub>	Charge : OFF		V <sub>CC</sub> -1.0		V <sub>CC</sub> +0.3	V
Low-voltage detection voltage	L <sub>V</sub>	A~F Rank		1.90	2.00	2.10	V/sell
		G Rank		2.00	2.15	2.30	
SW2 input current	I <sub>SW2</sub>				20		μA
SW2 input voltage	V <sub>L2</sub>	Low-voltage detection circuit : ON		-0.3		2.0	V
	V <sub>H2</sub>	Low-voltage detection circuit : OFF		V <sub>CC</sub> -1.0		V <sub>CC</sub> +0.3	V
Low voltage detection output leak current	I <sub>LV</sub>					0.2	μA
Low voltage detection output saturation voltage	V <sub>LV</sub>	I <sub>SINK</sub> =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 <sub>CC</sub> : OFF, SW1=GND : ON Goes OFF when open as it is pulled up to V <sub>CC</sub> .
2	SW2	Input	Low voltage detection circuit ON/OFF control input pin. SW2=V <sub>CC</sub> : OFF, SW2=GND : ON Goes OFF when open as it is pulled up to V <sub>CC</sub> .
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 <sub>CC</sub>		Power supply input pin.

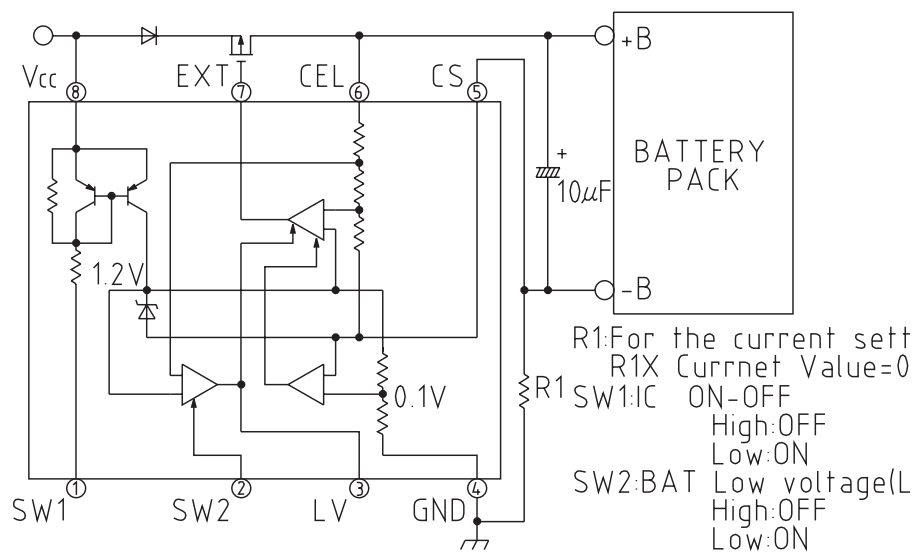
\*G : Constant voltage circuit input pin

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

