

Lithium-Ion Battery Charge Control (1~3-serial cells) Monolithic IC MM1332

Outline

This IC is a high-precision constant-voltage/constant-current power control IC for lithium-ion battery charge using a p-MOSFET as a power driver. It was developed for use with 1 to 3-cell chargers, and a constant current value can be set freely with an external resistor. It has a built-in amplifier for detecting low battery voltage. The lithium-ion battery charge function can be added to conventional chargers by using this IC.

Series Table

Temperature conditions A: Ta=-25~75°C, B: Ta=-20~70°C, C: Ta=0~50°C, D: Ta=0~40°C

	Package				Output voltage (V)	Output voltage temperature conditions	Full charge detection voltage (mV)	Over voltage detection voltage (v)	Remarks *
	SOP-8C, 8E	VSOP-8A, 8B	TSOP-16A	TSOP-24A					
MM1332	AF				4.100±0.050	B			1cell
	BF				8.200±0.100	B			2cell
	CF				12.300±0.150	B			3cell
	DF				4.200±0.050	B			1cell
	EF				8.400±0.100	B			2cell
	FF				12.600±0.150	B			3cell
	GF				Variable				

Features

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

Packages

SOP-8C, SOP-8E (MM1332□F)

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

Applications

- For lithium-ion battery charge
- High-precision output stabilized power supplies for various equipment

Absolute Maximum Ratings (Ta=25°C)

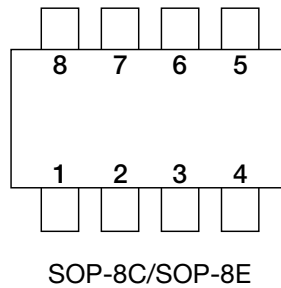
Item	Symbol	Rating	Units
Storage temperature	T _{STG}	-40~+125	°C
Operating temperature	T _{OPR}	-20~+70	°C
Power supply voltage	V _{CC} max.	-0.3~+18	V
Output voltage	V _O max.	-0.3~V _{CC}	V
SW input voltage	V _{SW}	-0.3~V _{CC} +0.3	V
Allowable power dissipation	P _d	300	mW

Electrical Characteristics (Unless otherwise specified Ta=25°C, V_{CC}=5V/CEL)

Item	Symbol	Measurement Conditions	Min	Typ.	Max.	Units
Operating power supply voltage range	V _{CC}	Minimum value is during constant-current control	2.5	5	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	V _L	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 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		GND 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.

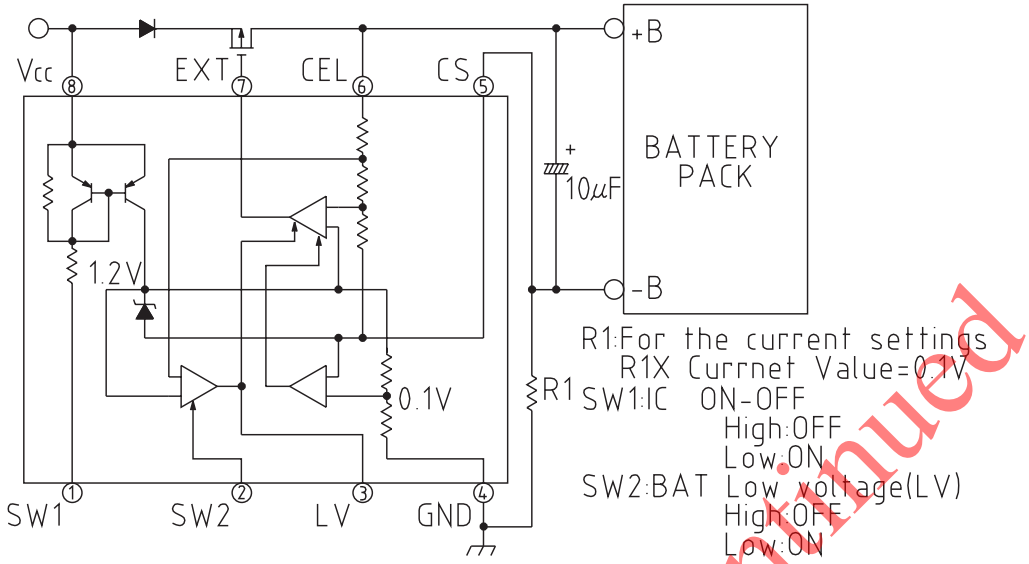
*G : Constant voltage circuit input pin

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

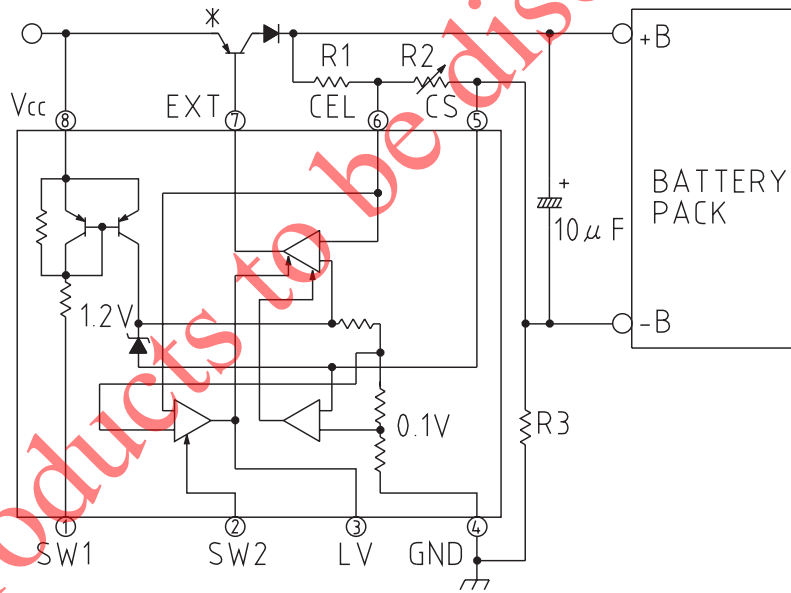
Low voltage detection voltage is set for one cell (4.1V or 4.2V).

Block Diagram

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



MM1332G

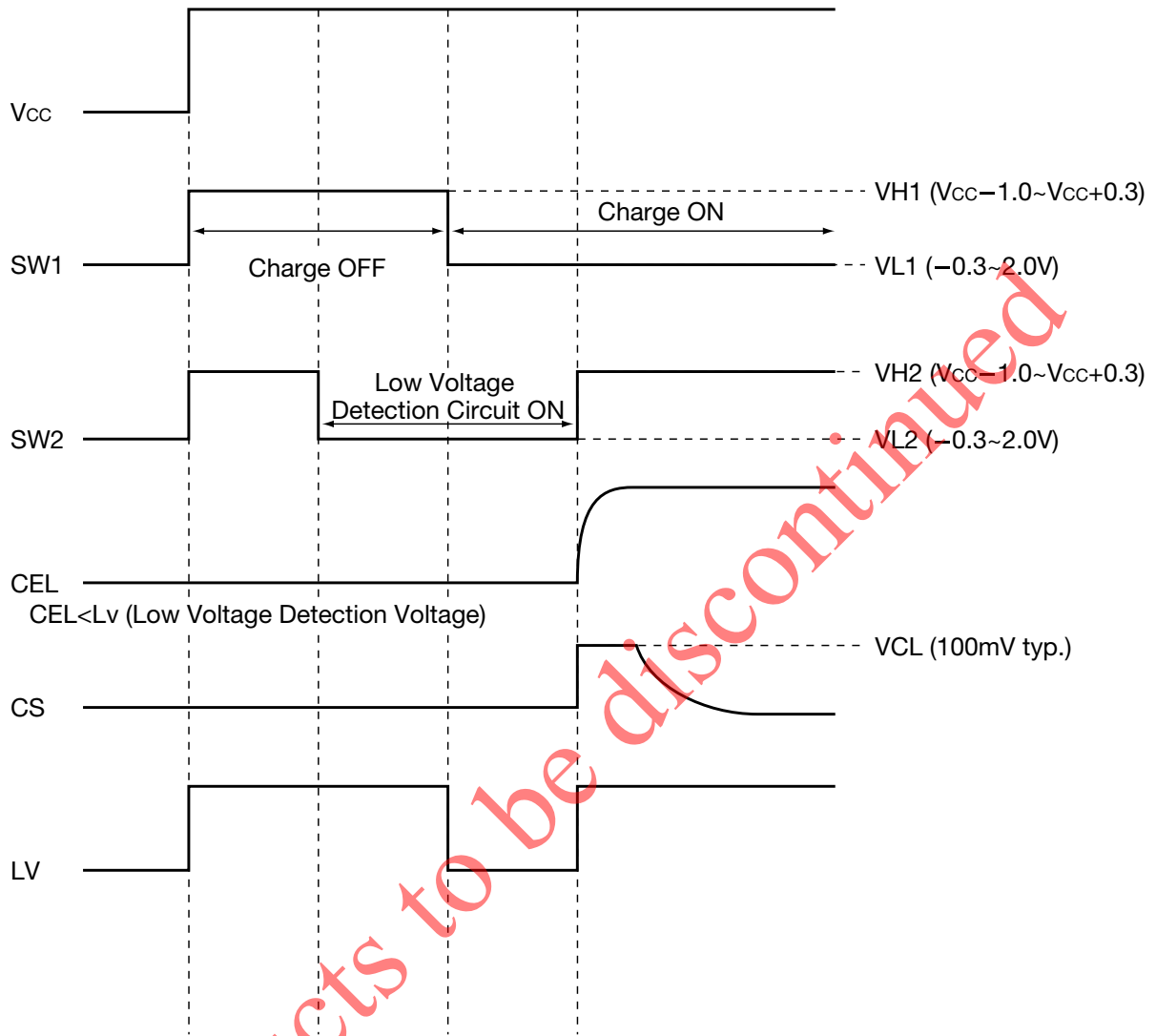


* PNP trahsister or P-ch FET

Products to be discontinued

Timing Chart

CEL<Lv (When Low Voltage Detection Voltage)



With LV pulled up to Vcc by a resistance

Products to be discontinued