

One Cell Li-ion/Li-Polymer Battery Protection IC

MM3825 Series

Outline

The MM3825 series are protection IC using high voltage CMOS process for overcharge, overdischarge and overcurrent protection of the rechargeable Lithium-ion or Lithium-polymer battery. The overcharge, overdischarge, discharging overcurrent, charging overcurrent, and short protection of the rechargeable one-cell Lithium-ion or Lithium-polymer battery can be detected. Each of these IC composed of four voltage detectors, short detection circuit, reference voltage sources, oscillator, counter circuit and logical circuits.

Applications

Lithium-ion rechargeable battery pack
Lithium-polymer rechargeable battery pack

Specification

Item	Specification	Unit
Operation temperature	-40~85	°C
Operating voltage	1.5~5.5	V

Features

Detection Voltage Setting Ranges and Accuracy

	Range	Ta=25°C
Overcharge Detection Voltage	3.6V~5.0V, 5mV Step	±20mV
Overdischarge Detection Voltage	2.0V~3.0V, 50mV Step	±35mV
Discharging Overcurrent Detection Voltage	20mV~300mV, 1mV Step	±2.5mV
Charging Overcurrent Detection Voltage	-20mV~-300mV, 1mV Step	±2.5mV
Short Detection Voltage	70mV~350mV, 1mV Step	±8%
0V Battery Charging Inhibition Voltage	1.1V~2.4V, 0.1V Step	±0.1V
	0.9V	±0.3V

Current consumption (Normal)

Normal mode	2.5 uA typ. 4.0uA max.
Stand-by mode	0.1uA max. (In case Overdischarge latch function Enable.) 0.5uA max. (In case Overdischarge latch function Disable.)

Current consumption (MM3825Txx Series)

Normal mode	2.0 uA typ. 3.0uA max.
Stand-by mode	0.05uA max. (In case Overdischarge latch function Enable.) 0.5uA max. (In case Overdischarge latch function Disable.)

Package

SSON-6J/SSON-6M
SSON-6U/SSON-6V
SON-6C



Terminal explanations

Pin No	Symbol	Function
1	NC	No connection.
2	COUT	Charge FET control terminal.
3	DOUT	Discharge FET control terminal.
4	VSS	Negative power supply voltage input terminal.
5	VDD	Positive power supply voltage input terminal.
6	V-	Input terminal for charger negative voltage.

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	VDD	-0.3	12	V
V- Terminal voltage	V-	VDD-28	VDD+0.3	V
COUT Terminal voltage	VCOUT	VDD-28	VDD+0.3	V
DOUT Terminal voltage	VDOUT	VSS-0.3	VDD+0.3	V
Storage temperature	Tstg	-55	125	°C

Electrical characteristics

(Unless otherwise specified, Ta=25°C)

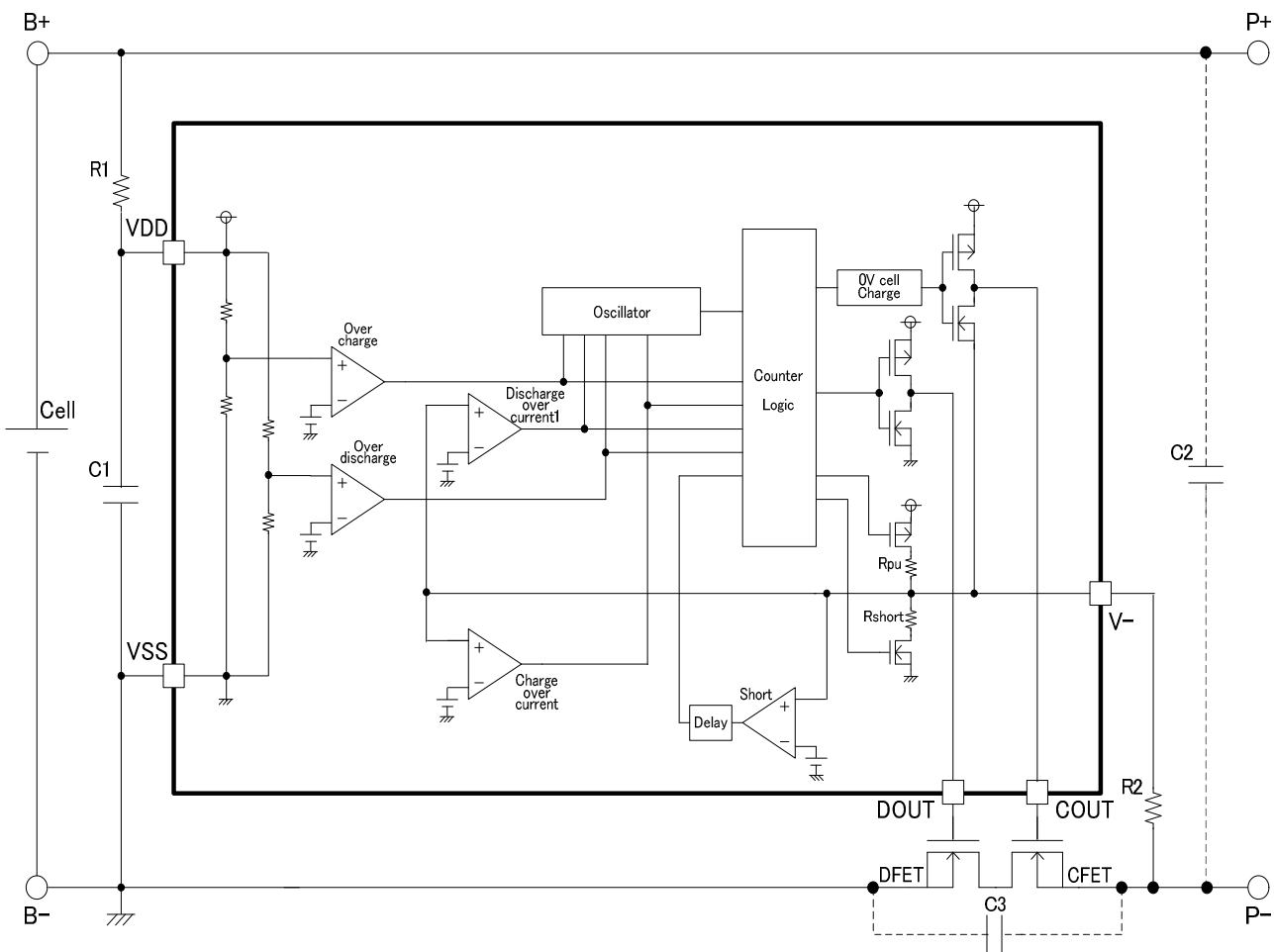
Parameter	Symbol	Note	Min	Typ	Max	Unit
Input/Output voltage						
Maximum forbidden voltage for 0V charging	Vst	Vst=1.1V~2.4V	Vst-0.1	Vst	Vst+0.1	V
		Vst=0.9V	0.6	0.9	1.2	V
Minimum operating voltage for 0V charging		"Permission" function	-	-	1.2	V
COUT L level output voltage	VcoL	ICOUT=30uA, VDD=4.5V	-	0.1	0.5	V
COUT H level output voltage	VcoH	ICOUT=-30uA, VDD=4.0V	VDD-0.5	VDD-0.1	-	V
DOUT L level output voltage	VdoL	IDOUT=30uA, VDD=2.0V	-	0.1	0.5	V
DOUT H level output voltage	VdoH	IDOUT=-30uA, VDD=4.0V	VDD-0.5	VDD-0.1	-	V
Current consumption						
Current consumption (Normal)	Idd	VDD=4.0V, V-=0V	-	2.5	4.0	uA
Current consumption at stand-by (Normal)	Is	Vdet2 = Vrel2	-	-	0.1	uA
		Vdet2 ≠ Vrel2	-	0.3	0.5	uA
Current consumption (MM3825Txx Series)	Idd	VDD=4.0V, V-=0V	-	2.0	3.0	uA
Current consumption at stand-by (MM3825Txx Series)	Is	Vdet2 = Vrel2	-	-	0.05	uA
		Vdet2 ≠ Vrel2	-	0.3	0.5	uA
Detection/Release voltage						
Overcharge detection voltage	Vdet1	Ta=-20 to 60°C	-0.020	Vdet1	+0.020	V
Overcharge release voltage	Vrel1	Vdet1 ≠ Vrel1	-0.030	Vrel1	+0.030	V
Overdischarge detection voltage	Vdet2		-0.035	Vdet2	+0.035	V
Overdischarge release voltage	Vrel2	Vdet2 ≠ Vrel2	-0.065	Vrel2	+0.090	V
Discharging overcurrent detection voltage	Vdet3	Ta=25°C	-2.5	Vdet3	+2.5	mV
		Ta=-20 to 60°C	-3.0		+3.0	
Charging overcurrent detection voltage	Vdet4	Ta=25°C	-2.5	Vdet4	+2.5	mV
		Ta=-20 to 60°C	-3.0		+3.0	
Short detection voltage	Vshort	Ta=25°C	-8%	Vshort	+8%	mV

Electrical characteristics

(Unless otherwise specified, Ta=25°C)

Parameter	Symbol	Note	Min	Typ	Max	Unit
Detection delay time						
Overcharge detection delay time	tVdet1		-20%	tVdet1	+20%	ms
Overdischarge detection delay time	tVdet2		-20%	tVdet2	+20%	ms
Discharging overcurrent detection delay time	tVdet3		-20%	tVdet3	+20%	ms
Charging overcurrent detection delay time	tVdet4		-20%	tVdet4	+20%	ms
Short detection delay time	tVshort		-30%	tVshort	+40%	us

Block diagram / Typical application circuit



Symbol	Part	Min.	Typ.	Max.	Unit
R1	Resistor	-	100	1k	Ω
C1	Capacitor	0.01	0.1	1.0	uF
R2	Resistor	-	1.0k	10k	Ω
C2/C3	Capacitor	-	0.1	-	uF

* This typical application circuit and constant value do not guarantee proper operation. Please evaluate thoroughly by actual application to set up constants.