

One-cell Li-ion/Li-polymer battery protection IC

MM3722 series

Outline

MM3722 series are Li-ion battery protection IC and detect charge current / discharge current with high precision by current sensing resistor (Rsns). In the One-cell battery pack, on resistance of the FET SW has been used for over-current/short-current detection. MM3722 realize over-current/short-current protection with high accuracy and with no temperature dependence by using a chip resistor.

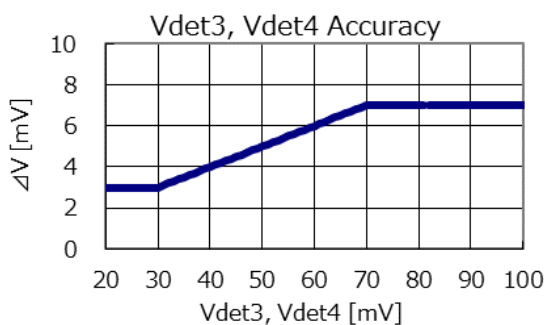
Features

(Unless otherwise specified, Ta=25°C)

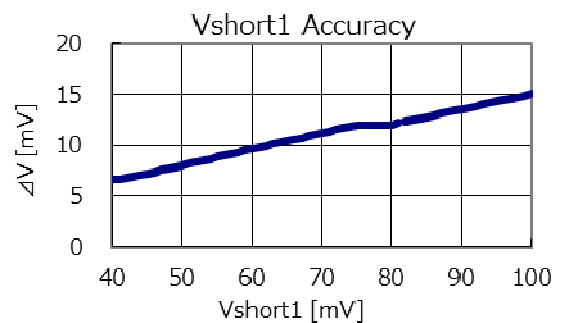
1) Range and accuracy of detection/release voltage

• Overcharge detection voltage	3.6V to 5.0V, 5mV steps	Accuracy±20mV
• Overcharge release voltage	Vdet1-0.2V to Vdet1, 5mV steps	Accuracy±30mV
• Overdischarge detection voltage	2.0V to 3.0V, 50mV steps	Accuracy±35mV
• Overdischarge release voltage	2.0V to 3.0V, 50mV steps	Accuracy+65 / -35mV (In case Vdet2=Vrel2) Accuracy+90 / -65mV (In case Vdet2≠Vrel2)
• Discharging overcurrent detection voltage	+20mV to +150mV, 1mV steps	Accuracy±ΔV *1
• Charging overcurrent detection voltage	-150mV to -20mV, 1mV steps	Accuracy±ΔV *1
• Short detection voltage1	+40mV to +250mV, 1mV steps	Accuracy±ΔV *2
• Short detection voltage2	VDD-0.9	Accuracy±300mV
• 0V battery charge inhibition battery voltage	1.3V to 1.8V, 0.1V steps	Accuracy±100mV
	0.9V	Accuracy±300mV

*1 Current detection voltage Accuracy



*2 Short detection voltage1 Accuracy



2) Range of detection delay time

• Overcharge detection delay time	Selection from 256ms to 4.6s
• Overdischarge detection delay time	Selection from 8ms to 256ms
• Discharging overcurrent detection delay time	Selection from 8ms to 256ms
• Charging overcurrent detection delay time	Selection from 6ms to 64ms
• Short detection delay time	Selection from 250us to 400us





Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply voltage	VDD	-0.3	12	V
V- terminal	V-	VDD-28	VDD+0.3	V
CS terminal	VCS	VSS-0.3	VDD+0.3	V
COOUT terminal	VCOOUT	VDD-28	VDD+0.3	V
DOOUT terminal	VDOOUT	VSS-0.3	VDD+0.3	V
Storage temperature	Tstg	-55	125	°C

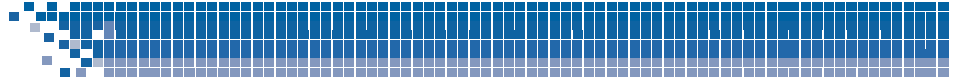
Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Operating ambient temperature	To _{pr}	-40	85	°C
Operating voltage	V _{op}	1.5	5.5	V

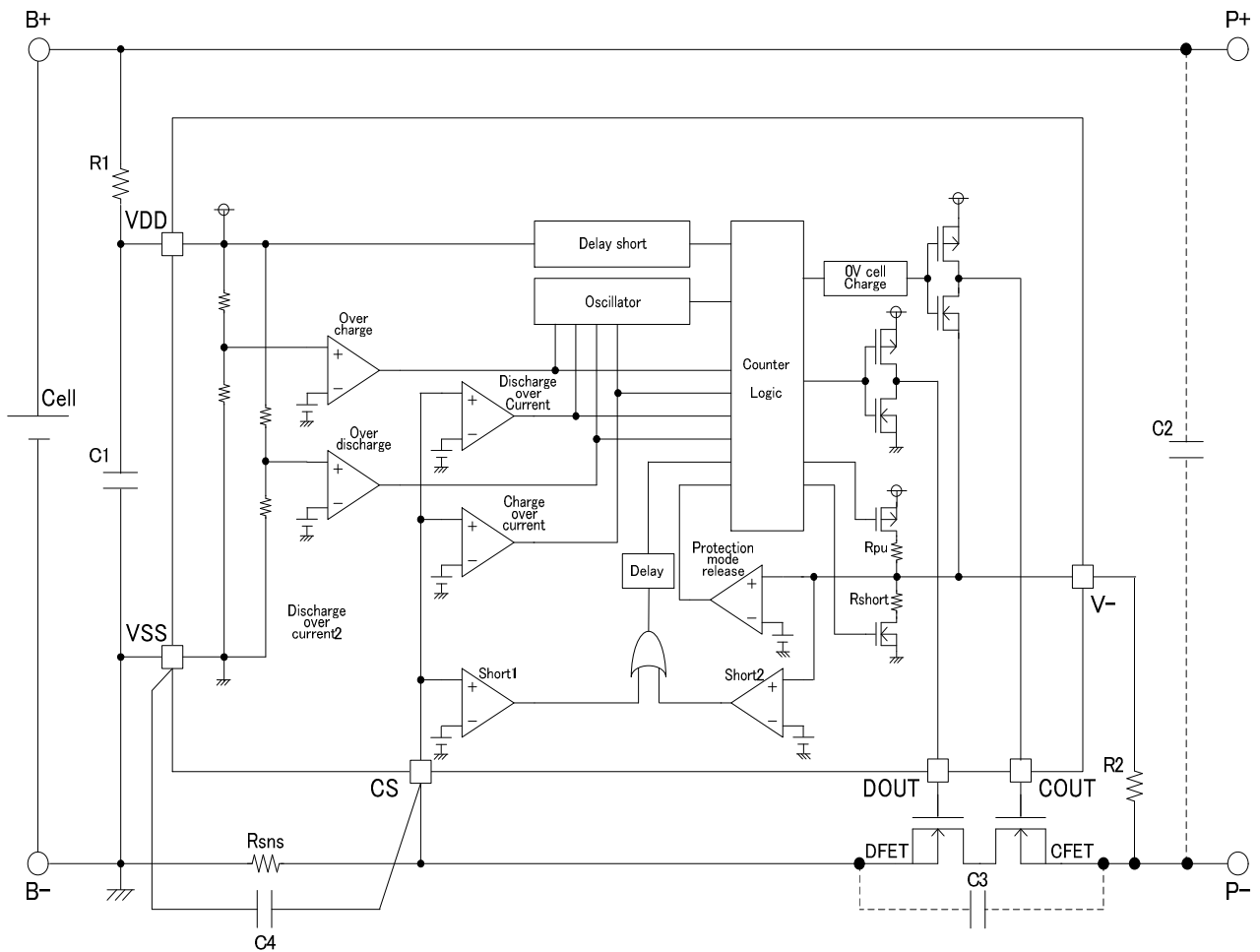
Electrical characteristics

(Unless otherwise specified, Ta=25°C)

Parameter	Symbol	Note	Min	Typ	Max	Unit
Input/Output voltage						
Maximum forbidden voltage for 0V charging	Vst	Vst=1.3V~1.8V	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
COOUT L level output voltage	VcoL	ICOUT=30uA, VDD=4.5V	-	0.1	0.5	V
COOUT H level output voltage	VcoH	ICOUT=-30uA, VDD=4.0V	VDD-0.5	VDD-0.1	-	V
DOOUT L level output voltage	VdoL	IDOUT=30uA, VDD=2.0V	-	0.1	0.5	V
DOOUT H level output voltage	VdoH	IDOUT=-30uA, VDD=4.0V	VDD-0.5	VDD-0.1	-	V
Current consumption						
Current consumption	I _{dd}	VDD=4.0V, V-=0V	-	3.0	6.0	uA
Current consumption at stand-by	I _s	Vdet2=Vrel2	-	-	0.1	uA
		Vdet2≠Vrel2	-	0.3	0.6	uA
Detection/Release voltage						
Overcharge detection voltage	Vdet1	Ta=+25°C	Typ-0.020	Vdet1	Typ+0.020	V
		Ta=-20~+60°C	Typ-0.025		Typ+0.025	
Overcharge release voltage	Vrel1	Vdet1≠Vrel1	Typ-0.030	Vrel1	Typ+0.030	V
Overdischarge detection voltage	Vdet2		Typ-0.035	Vdet2	Typ+0.035	V
Overdischarge release voltage	Vrel2	Vdet2=Vrel2	Typ-0.035	Vrel2	Typ+0.065	V
		Vdet2≠Vrel2	Typ-0.065	Vrel2	Typ+0.090	V
Discharging overcurrent detection voltage	Vdet3		Typ-ΔV	Vdet3	Typ+ΔV	V
Charging overcurrent detection voltage	Vdet4		Typ-ΔV	Vdet4	Typ+ΔV	V
Short detection voltag1	Vshort1		Typ-ΔV	Vshort1	Typ+ΔV	V
Short detection voltag2	Vshort2		Typ-0.300	Vshort2	Typ+0.300	V
Detection delay time						
Overcharge detection delay time	tVdet1		Typ*0.8	tVdet1	Typ*1.2	s
Overdischarge detection delay time	tVdet2		Typ*0.8	tVdet2	Typ*1.2	ms
Discharging overcurrent detection delay time	tVdet3		Typ*0.8	tVdet3	Typ*1.2	ms
Charging overcurrent detection delay time	tVdet4		Typ*0.8	tVdet4	Typ*1.2	ms
Short detection delay time	tVshort		Typ*0.7	tVshort	Typ*1.4	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	μF
R2	Resistor	-	1.0k	10k	Ω
C2/C3/C4	Capacitor	-	0.1	-	μF
Rsns	Sense resistor	-	-	20	$\text{m}\Omega$

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

