RCL10XX Series for Chip-On-Board Application
Li Battery Protectors
RCL102B-3255A/RCL103C-2753A/RCL103B-2753A

General Description

The RCL10XX Series are Lithium-ion (Li+) and lithium polymer rechargeable battery protection ICs with high accuracy voltage detection. They are suitable for protecting single cell Lithium-ion or lithium polymer battery packs from over-charge/discharge, and over-current.

This file introduces the own property of protection ICs for COB. It will be a good reference for engineers to do some COB design with RCL10XX Series.

Glossary

l **COB**：Chip On Board

l **Threshold voltage**：One of the features of rechargeable battery protection ICs. It identifies when the IC will output a signal to cut off the current loop if any abnormal state appears.

l **Delay time**：One of the features of rechargeable battery protection ICs. Before an action of protection occurs, it will go through a **Delay time.**

Overview

Feature1：Vdet1 (Detection voltage of overcharge)

The threshold of overcharge is defined by electrical trimming for RCL10XX Series,so:

l The typical threshold can be chosen from 4.200v to 4.400v flexibly

l Deferent grade for precision of threshold may be easily provided.

Feature2: Vdet2 (Detection voltage of over-discharge)

This value is related to Vdet1. It is a constant when Vdet1 is fixed.

Feature3: Vdet3 (Detection voltage of excess current1)

The Rds(on) of MOSFET has to be considered when you choose this parameter. Because actual threshold of excess current lies on not only Vdet3(of IC), but also Rds(on)(of MOSFET).

Feature4: Vdet4 (Detection voltage of excess current2)

Feature5: Vdet5 (Detection voltage of Charger)

Block Diagram
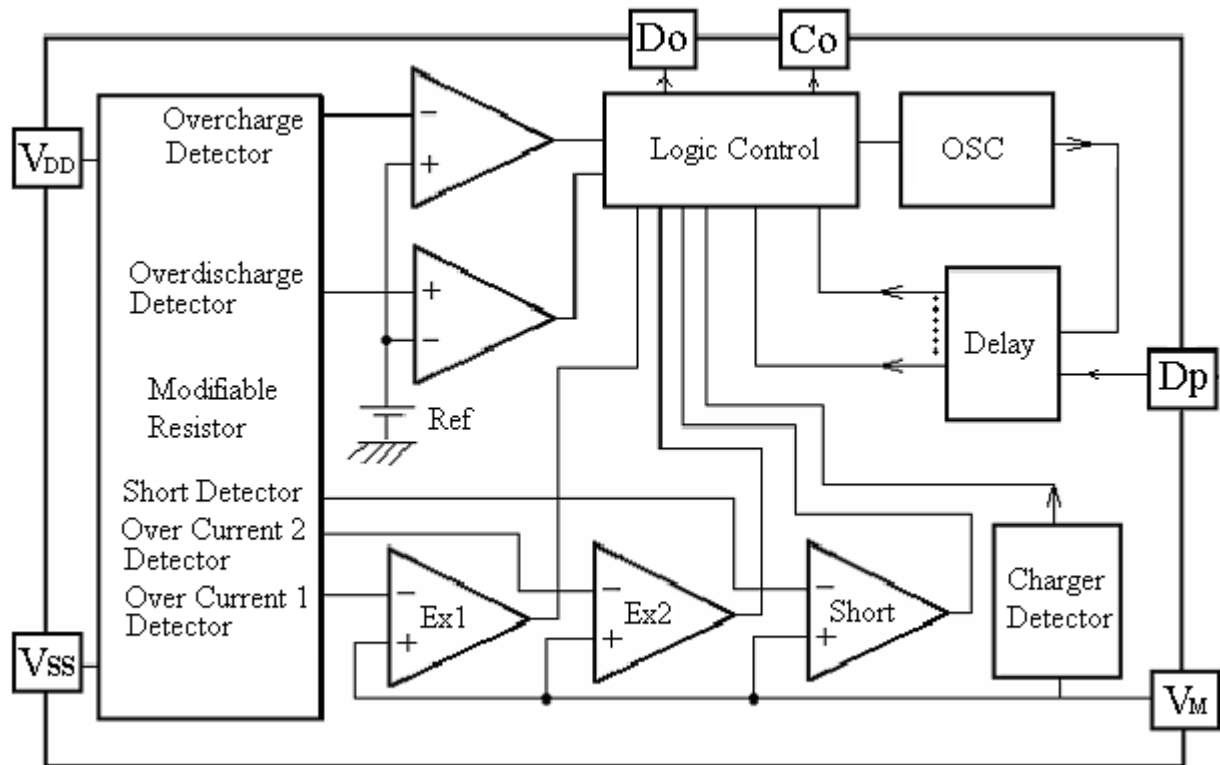
Pin Description

Pin	Symbol	Description
1	D_O	Over-discharge detection, CMOS output
2	V_M	Connected to P- pin
3	C_O	Over-charge detection, CMOS output
4	D_P	Test Pin. Tdet1 (Overcharge delay time) will be shorten when it connected to Vdd.
5	V_{DD}	Power supply
6	V_{SS}	Ground

Parameters Table

Main parameters

Type Name.	Vdet1	Vdet2	Vdet3	Vdet4	Vshort
RCL102B-3255A	4.325v±25mv	2.50v±70mv	0.15v±20mv	0.50v±0.1v	0.80v±0.2v
RCL103C-2753A	4.275v±25mv	2.30v±70mv	0.15v±20mv	0.50v±0.1v	0.80v±0.2v
RCL103B-2753A	4.275v±25mv	2.30v±70mv	0.10v±15mv	0.50v±0.1v	0.80v±0.2v

Secondary Parameters

Type Name	Vdet1-Vrel1	Tdet1	Vrel2-Vdet2	Tdet2	Tdet3	Tdet4	Tshort
RCL102B-3255A	0.25v±0.1v	0.6s±40%	0.40v±0.15v	77ms±40%	4.8ms±40%	1.2ms±40%	150us±40%
RCL103C-2753A	0.10v±0.05v	0.6s±40%	0.10v±0.05v	77ms±40%	4.8ms±40%	1.2ms±40%	150us±40%
RCL103B-2753A	0.10v±0.05v	0.6s±40%	0.10v±0.05v	77ms±40%	4.8ms±40%	1.2ms±40%	150us±40%

Absolute Maximum Ratings （Ta= 25 ℃ VSS=0V）

Symbol	Item	Ratings	Unit
Vc	Supply voltage	-0.3 to 12	V
V_M	V_M pin input voltage	Vc-28 to Vc+0.3	V
V_{CO}	Co pin output voltage	Vc-28 to Vc+0.3	V
V_{DO}	Do pin output voltage	Vss-0.3 to Vc+0.3	V
Pd	Power dissipation	150	mW
Topt	Operating temperature range	-40 to 85	℃
Tstg	Storage temperature range	-55 to 125	℃

Caution: These values must therefore not be exceeded under any conditions!

Other Parameters

Symbol	Comment	Test conditions	Min	**Typ.**	Max	Unit
Vc_{OL}	C_{OUT} Pin L Voltage	I_{OL}=50uA,Vc=4.4V		**0.35**	0.4	V
Vc_{OH}	C_{OUT} Pin H Voltage	I_{OH}=-50uA, Vc=3.9V	3.60	**3.7**		V
V_{DOL}	D_{OUT} Pin L Voltage	I_{OL}=50uA,Vc=2.3V		**0.23**	0.30	V
V_{DOH}	D_{OUT} Pin H Voltage	I_{OH}=- 50uA, Vc=3.9V	3.60	**3.69**		V
I_{DD}	Supply current	Vc =3.9V, V_M = 0V		**2.8**	7.0	uA
$I_{STANDBY}$	Standby current	Vc =2.0V		**0.1**	1.0	uA

Typical application

Notes

R_1 and C_1 are to stabilize the supply voltage of the RCL10XX series; $R_1 C_1$ is hence regarded as the time constant for V_C pin; R_1 and R_2 can also be a part of current limit circuit for the RCL10XX series. Recommended values of these elements are as follows:

| $R_1 < 1k \Omega$. A larger value of R1 results in higher detection voltage, introducing errors.

| $R_2 < 2.5k \Omega$. A larger value of R_2 possibly prevents resetting from over-discharge even with a charger.

| $R_1 + R_2 > 1k \Omega$. Smaller values may lead to power consumption over the maximum dissipation rating of the RCL10XX series.

Wafer information

RCL10XX Series：.

Die Size   :1200×750um
Dicing Width   :X Direction:120um Y Direction:90 um
PAD Size   :85×**85um**

Pin definition	center coordinate (um)	$\Delta X \times \Delta Y$ (um)
Do	-518， 295	85 x 85
VSS	-518， 58	85 x 85
DP	-519， -262	85 x 85
VDD	518， -285	85 x 85
Co	518， 61	85 x 85
VM	518， 283	85 x 85