RICOH

R5403x/R5405x Series

Li-ion/polymer 1Cell Protector

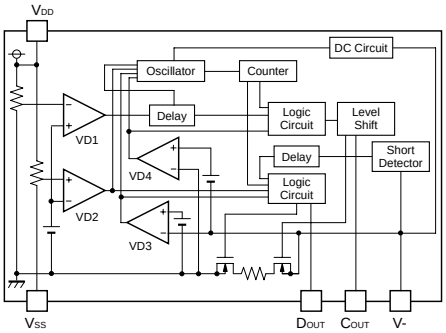
R5403x/R5405x Series are high input voltage CMOS-based protection ICs for over-charge/discharge of rechargeable one-cell Lithium-ion (Li-ion) / Lithium polymer excess load current, further include a short circuit protector for preventing large external short circuit current and excess charge/discharge-current. Each of these ICs is composed of four voltage detectors, a reference unit, a delay circuit, a short circuit protector, an oscillator, a counter, and a logic circuit.
In addition to SOT-23-5 and SOT-23-6 packages, DFN(PLP)1616-6, DFN(PLP)1820-6 and DFN1814-6 are also available.

FEATURES

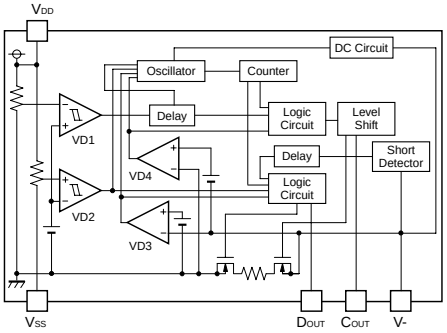
- Supply Voltage (V_{DD}) ····· 12V (Absolute Maximum Rating)
- Charger Negative Input Voltage (V-)··· -30V (Absolute Maximum Rating)
- Operating Input Voltage Range (V_{DD})···· 1.5V to 5.0V
- Supply Current (I_{DD}) ····· Typ. 4.0μA
- Standby Current (I_S) ····· Max. 0.1μA (C, E, G Version)
  Typ. 1.2μA (D, F Version)
- Over-charge (V_{DET1})
  - Detector Threshold Range····· 4.0V to 4.5V (0.005V steps)
  - Detector Threshold Accuracy··· ±25mV (25°C)
    ±30mV (-5°C to 55°C)
  - Output Delay Time (tV_{DET1})····· Typ. 1.0s
- Over-discharge (V_{DET2})
  - Detector Threshold Range····· 2.0V to 3.0V (0.1V steps)
  - Detector Threshold Accuracy··· ±2.5%
  - Output Delay Time (tV_{DET2})····· Typ. 20ms
- Excess discharge-current (V_{DET3})
  - Detector Threshold Range···· 0.05V to 0.20V (0.005V steps)
  - Detector Threshold Accuracy ···· ±15mV
  - Output Delay Time (tV_{DET3}) ··· Typ. 6ms or 12ms or 18ms
- Excess charge-current (V_{DET4})
  - Detector Threshold Range···· -0.05V to -0.20V (0.005V steps)
  - Detector Threshold Accuracy ···· ±30mV
  - Output Delay Time (tV_{DET4}) ··· Typ. 8ms or 16ms
- Short Protection
  - Voltage (V_{short})····· Typ. 0.8V
  - Output Delay Time (t_{short}) ····· Typ. 200μs or 300μs or 400μs
- 0V-battery charge····· Selectable
- Packages ····· DFN1814-6,
  DFN(PLP)1616-6
  DFN(PLP)1820-6,
  SOT-23-5, SOT-23-6

BLOCK DIAGRAMS

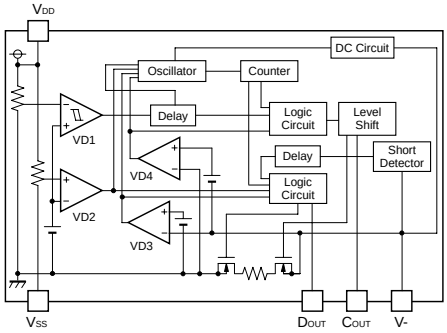
R5403/05xxxxCC/EC/KG/PG



R5403/05xxxxKD/KF



R5403/05xxxxKE



SELECTION GUIDES

Package	Quantity per Reel	Part No.
DFN(PLP)1820-6	5,000 pcs	R5403Kxxx$∗-TR
SOT-23-5	3,000 pcs	R5403Nxxx$∗-TR-FE

Package	Quantity per Reel	Part No.
DFN1814-6	5,000 pcs	R5405Lxxx$∗-TR
DFN(PLP)1616-6	5,000 pcs	R5405Kxxx$∗-TR
SOT-23-6	3,000 pcs	R5405Nxxx$∗-TR-FE

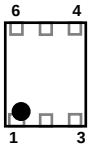
xxx: Serial Number for the R5403x/R5405x Series designating input four threshold for over-charge, over-discharge, excess discharge-current, and excess charge-current detectors

$: Designation of Output delay time option of excess charge-current, excess discharge-current, and Short Circuit
- (C) tV_{DET3}=12ms, tV_{DET4}=16ms, tShort=300μs
- (E) tV_{DET3}=6ms, tV_{DET4}=8ms, tShort=200μs
- (K) tV_{DET3}=12ms, tV_{DET4}=8ms, tShort=300μs
- (P) tV_{DET3}=18ms, tV_{DET4}=16ms, tShort=400μs

∗: Designation of protection type and 0V-battery charge is available or unavailable
- (C) With Latch function after Over-charge and Over-discharge. 0V-battery charge is available
- (D) Auto Release after Over-charge and Over-discharge. 0V-battery charge is available.
- (E) Auto Release after Over-charge and with latch function after Over-discharge. 0V-battery charge is available.
- (F) Auto Release after Over-charge and Over-discharge. 0V-battery charge is unavailable.
- (G) With Latch function after Over-charge and Over-discharge. 0V-battery charge is unavailable.

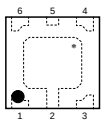
PACKAGES (Top View)

DFN1814-6



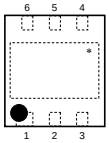
1	NC
2	COUT
3	DOUT
4	VSS
5	VDD
6	V-

DFN(PLP)1616-6



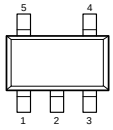
1	VSS
2	VDD
3	V-
4	COUT
5	NC
6	DOUT

DFN(PLP)1820-6



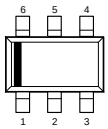
1	V-
2	COUT
3	DOUT
4	VSS
5	VDD
6	NC

SOT-23-5



1	V-
2	VDD
3	VSS
4	DOUT
5	COUT

SOT-23-6



1	DOUT
2	V-
3	COUT
4	NC
5	VDD
6	VSS

∗) The tab is substrate level (V_{DD})

APPLICATIONS

- Li-ion / Li polymer protector of over-charge, over-discharge, excess discharge-current, excess charge-current for battery pack
- High precision protectors for cell-phones and any other gadgets using on board Li-ion / Li polymer battery

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