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
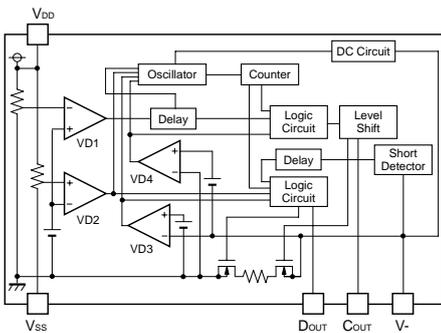
R5403/05xxxxKD/KF
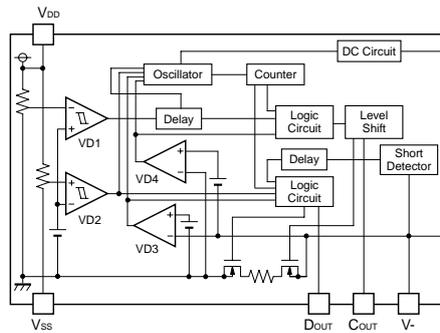
R5403/05xxxxKE
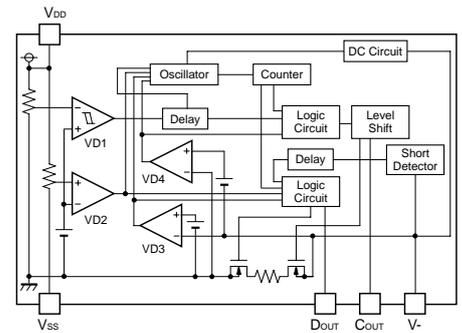
SELECTION GUIDES

Package	Quantity per Reel	Part No.
DFN(PLP)1820-6	5,000 pcs	R5403K xxx $ ∗ -TR
SOT-23-5	3,000 pcs	R5403N xxx $ ∗ -TR-FE

Package	Quantity per Reel	Part No.
DFN1814-6	5,000 pcs	R5405L xxx $ ∗ -TR
DFN(PLP)1616-6	5,000 pcs	R5405K xxx $ ∗ -TR
SOT-23-6	3,000 pcs	R5405N xxx $ ∗ -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		DFN(PLP)1616-6		DFN(PLP)1820-6		SOT-23-5		SOT-23-6	
1	NC	1	V_{SS}	1	V-	1	V-	1	D_{OUT}
2	C_{OUT}	2	V_{DD}	2	C_{OUT}	2	V_{DD}	2	V-
3	D_{OUT}	3	V-	3	D_{OUT}	3	V_{SS}	3	C_{OUT}
4	V_{SS}	4	C_{OUT}	4	V_{SS}	4	D_{OUT}	4	NC
5	V_{DD}	5	NC	5	V_{DD}	5	C_{OUT}	5	V_{DD}
6	V-	6	D_{OUT}	6	NC			6	V_{SS}

∗) 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

RoHS Compliant
Halogen Free

Ricoh is committed to reducing the environmental loading materials in electrical devices with a view to contributing to the protection of human health and the environment.
Ricoh has been providing RoHS compliant products since April 1, 2006 and Halogen-free products since April 1, 2012.

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Authorized Distributor

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[Ricoh Electronics](#):
  R5405L292KF-TR R5405K128EC-TR R5405K144KE-TR R5405L193KD-TR R5405L273KF-TR R5405L291KD-TR