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 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)
  Max. 2.0μA (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 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 ··· DFN(PLP)1616-6, DFN(PLP)1820-6, SOT-23-5, SOT-23-6

BLOCK DIAGRAMS

R5403/05xxxxCC/EC/KG/PG
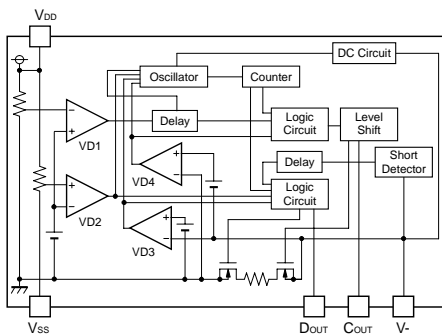
R5403/05xxxxKD/KF
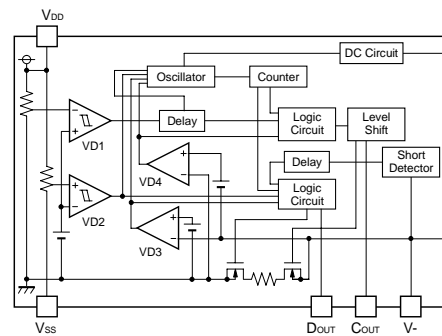
R5403/05xxxxKE
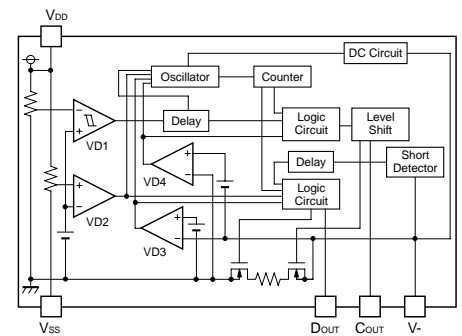
SELECTION GUIDES

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.
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)

DFN(PLP)1616-6		DFN(PLP)1820-6		SOT-23-5		SOT-23-6	
1	V_{SS}	1	V-	1	V-	1	D_{OUT}
2	V_{DD}	2	C_{OUT}	2	V_{DD}	2	V-
3	V-	3	D_{OUT}	3	V_{SS}	3	C_{OUT}
4	C_{OUT}	4	V_{SS}	4	D_{OUT}	4	NC
5	NC	5	V_{DD}	5	C_{OUT}	5	V_{DD}
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