RP202x Series

Automatic Mode Shift Low Voltage 200mA LDO

The RP202x Series are CMOS-based auto mode switching LDO regulators featuring 200mA output. In auto switching mode, the operation can switch automatically to fast response mode or low power mode of the ECO function according to output current. (Automatic switching to fast response mode under I_{OUT}>8mA conditions or to low power mode under I_{OUT}<1mA conditions.)
In low power mode, supply current is as low as 2.5µA. In fast response mode, ripple rejection is 70dB and noise is low. RP202x requires neither ECO pin for switching mode nor microcontroller pin. RP202x supports low voltage, featuring input voltage from 1.4V and output voltage from 0.8V. Standby mode and auto-discharge function are also available. In addition to SOT-23-5 and SC-88A packages, and a 1mm square DFN(PLP)1010-4 are also available. RP202x Series contributes to the downsizing of the hand-held equipment because it can use the 0.47µF ceramic capacitor.

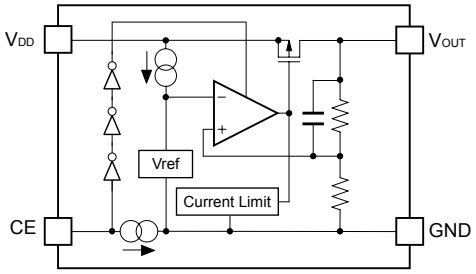
FEATURES

- Supply Current (I_{SS2}) ····· Typ. 50µA (Fast mode, V_{IN}=SET V_{OUT}+1.0V)
- Supply Current (I_{SS1}) ····· Typ. 2.5µA (Low power mode, same as above, V_{OUT}=2.8V)
- Standby Current ($I_{standby}$) ····· Typ. 0.1µA (Same as above, CE="L")
- Dropout Voltage (V_{DIF}) ····· Typ. 0.20V (I_{OUT}=200mA, V_{OUT}=2.8V)
- Ripple Rejection (RR) ····· Typ. 70dB (f=1kHz, Fast mode)
- Input Voltage Range (V_{IN}) ····· 1.4V to 5.25V
- Output Voltage Range (V_{OUT}) ····· 0.8V to 4.0V (internally fixed)
- Output Voltage Accuracy ····· ± 1%
- Temp. coeff. of Output Voltage ····· Typ. ± 100ppm/°C
- Line Regulation ····· Typ. 0.02%/V (Fast mode)
- Fold-back Protection Circuit ····· Current limit Typ. 60mA
- Auto-Discharge function ····· D Version
- Constant Slope Circuit
- Packages ····· DFN(PLP)1010-4, SC-88A, SOT-23-5
- Ceramic capacitor can be used. ····· 0.47µF or more

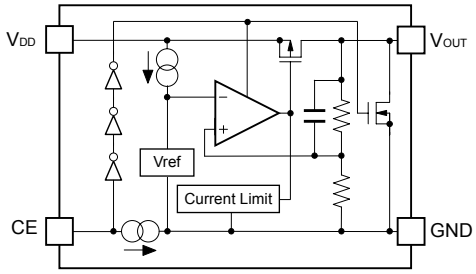
(The above shows specification at Topt=25°C. Design assurance value at -40°C ≤ Topt ≤ 85°C is also available. For details, please refer to the datasheet.)

BLOCK DIAGRAMS

RP202xxxxB
(Without Auto-Discharge function)



RP202xxxxD
(With Auto-Discharge function)



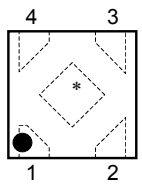
SELECTION GUIDES

Halogen Free	Package	Q'ty per Reel	Part No.
H/F	DFN(PLP)1010-4	10,000 pcs	RP202Kxx1*-TR
H/F	SC-88A	3,000 pcs	RP202Qxx2*-TR-FE
H/F	SOT-23-5	3,000 pcs	RP202Nxx1*-TR-FE

xx : Specify the output voltage within the range of 0.8V (08) to 4.0V (40) in 0.1V steps.
* : Select from (B) without auto-discharge function or (D) with auto-discharge function

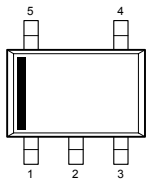
PACKAGES (Top View)

DFN(PLP)1010-4



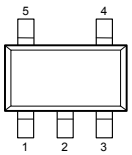
1	VOUT
2	GND
3	CE
4	VDD

SC-88A



1	CE
2	NC
3	GND
4	VOUT
5	VDD

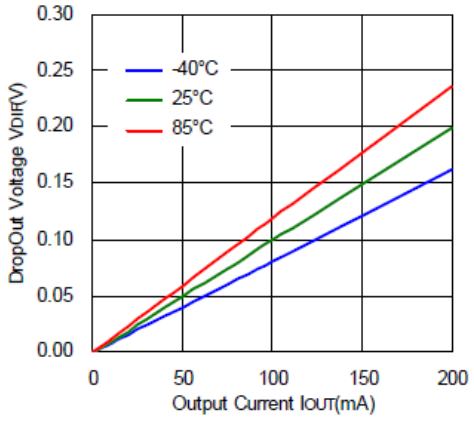
SOT-23-5



1	VDD
2	GND
3	CE
4	NC
5	VOUT

TYPICAL CHARACTERISTIC

RP202x28xx Dropout Voltage vs. Output Current



APPLICATIONS

- Power source for hand-held communication equipment, camera and VCRs
- Power source for home appliances and digital home appliance
- Power source for battery-powered equipment

Automatic Mode Shift Low Voltage 200mA LDO

How to Switch the ECO Function

An increasing number of devices such as mobile phones, do not have only a talk mode (active mode) and Off mode state, but also a standby mode (sleep mode) etc. However during the active mode and sleep mode the regulator must satisfy very different requirements.
The regulators are required to have a fast response and a high ripple rejection in the active mode, but consume low supply current in the sleep mode. To satisfy these conflicting requirements, Ricoh's regulators include an ECO Function that allows switching between a fast response mode and a low power mode.

There are three methods of switching the ECO Function and Ricoh offers four types of products utilizing each method.

①Manual Mode Shift Type (With ECO pin)···· The mode is switched by sending a control signal to the ECO pin.
The user can set the switching conditions but a CPU control pin is required.

②Automatic Mode Shift Type ····· The ECO pin is eliminated and the regulator automatically switches mode depending on system load.
A CPU I/O pin can be omitted but the user cannot set the switching conditions.

③Seamless Type····· Instead of switching between two modes, a smooth transition is made between modes.
Seamless means "no step" so the transition is made without a step.

④Manual/Automatic Mode Shift Type····· The mode is switched by sending a control signal to the AE pin.
When AE="H", the mode is set to the fast response mode, and when AE="L", the regulator operates in Automatic Mode Shift Type.
This type has both advantage of the Manual Mode Shift Type and the Automatic Mode Shift Type. This type is adopted in RP200x and RP201x.

Automatic Mode Shift Type Comparison

	RP202x	R1118x	R1510S (+VD)	R5326x (Dual)
Input voltage Range	1.4V to 5.25V	1.4V to 6.0V	3.5V to 36.0V	1.4V to 6.0V
Output voltage Range	0.8V to 4.0V	0.8V to 4.2V	2.5V to 12.0V	0.8V to 4.2V
Output Voltage Accuracy	±1%	±1%	±1.6%	±1%
Output Current	200mA	150mA	300mA	150mA
Supply Current	50μA (Fast mode) 2.5μA (Low power mode)	50μA (Fast mode) 5.5μA (Low power mode)	110μA (Fast mode) 12.5μA (Low power mode)	50μA × 2 (Fast mode) 5.5μA × 2 (Low power mode)
Standby Current	0.1μA	0.1μA	10μA	0.1μA × 2
Ripple Rejection	70dB (Fast mode)	70dB (Fast mode)	-	70dB (Fast mode)
Output Capacitor	0.47μFor more	1μFor more	6.8μFor more	1μF to 3.3μFor more
Dropout Voltage (Typ.)	200mV (200mA/2.8V)	270mV (150mA/2.8V)	1V (300mA/5.0V)	190mV (150mA/2.8V)
Line Regulation	0.02%/V	0.02%/V	0.01%/V	0.02%/V
Load regulation	Max. 30mV (200mA)	Max. 80mV (150mA)	Max. 40mV (300mA)	Max. 80mV (150mA)
Packages	DFN (PLP) 1010-4, SC-88A, SOT-23-5	DFN (PLP) 1612-4B, SOT-23-5	HSOP-8E	WLCSP-6-P1, DFN (PLP) 1820-6
Others	Constant Slope Circuit		Thermal Shutdown Circuit	

Ricoh Co.,LTD. Electronic Devices Company

■ **Ricoh presented with the Japan Management Quality Award for 1999.**
Ricoh continually strives to promote customer satisfaction, and shares the achievements of its management quality improvement program with people and society.

■ **Ricoh awarded ISO 14001 certification.**
The Ricoh Group was awarded ISO 14001 certification, which is an international standard for environmental management systems, at both its domestic and overseas production facilities. Our current aim is to obtain ISO 14001 certification for all of our business offices.

RoHS Compliant
Ricoh completed the organization of the Lead-free production for all of our products. After Apr. 1, 2006, we will ship out the lead free products only. Thus, all products that will be shipped from now on comply with RoHS Directive.

http://www.ricoh.com/LSI/

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