

## Manual/Automatic Mode Shift Low Voltage 150mA LDO

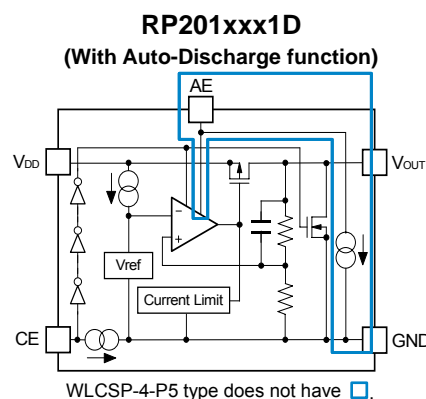
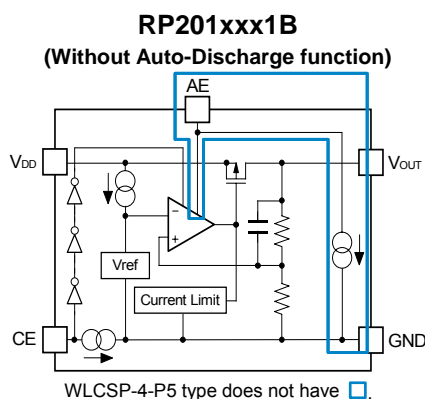
The RP201x Series are CMOS-based manual/automatic mode shift LDO regulators featuring 150mA output. In auto switching mode, the operation can switch automatically to fast response mode or low power mode of the ECO function according to output current. (Automatic switching to fast response mode under  $I_{OUT} > 8\text{mA}$  conditions or to low power mode under  $I_{OUT} < 1\text{mA}$  conditions.) In low power mode, supply current is as low as  $1.5\mu\text{A}$ . In fast response mode, ripple rejection is 70dB and noise is low. By inputting control signal into the AE pin, the mode of the regulator can be fixed with fast response mode. In addition to a 0.69mm square WLCSP-4-P5 package and a 1.2mm square DFN(PLP)1212-6 are also available.

### FEATURES

- Supply Current ( $I_{SS2}$ ) ..... Typ.  $55\mu\text{A}$  (Fast mode,  $V_{IN} = \text{SET } V_{OUT} + 1.0\text{V}$ )
- Supply Current ( $I_{SS1}$ ) ..... Typ.  $1.5\mu\text{A}$  (Low power mode, same as above,  $V_{OUT} = 2.8\text{V}$ )
- Standby Current ( $I_{standby}$ ) ..... Typ.  $0.1\mu\text{A}$  (Same as above,  $\text{CE} = \text{"L"}$ )
- Dropout Voltage ( $V_{DIF}$ ) ..... Typ.  $0.12\text{V}$  ( $I_{OUT} = 150\text{mA}$ ,  $V_{OUT} = 2.8\text{V}$ )
- Ripple Rejection (RR) ..... Typ. 70dB ( $f = 1\text{kHz}$ , 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 .....  $\pm 1\%$
- Temp. coeff. of Output Voltage ..... Typ.  $\pm 50\text{ppm}/^\circ\text{C}$
- Line Regulation ..... Typ.  $0.02\%/V$  (Fast mode)
- Fold-back Protection Circuit ..... Current limit Typ. 50mA
- Auto-Discharge function ..... D Version
- Packages ..... WLCSP-4-P5, DFN(PLP)1212-6,
- Ceramic capacitor can be used. ....  $1\mu\text{F}$  or more

(The above shows specification at  $T_{opt} = 25^\circ\text{C}$ . Design assurance value at  $-40^\circ\text{C} \leq T_{opt} \leq 85^\circ\text{C}$  is also available. For details, please refer to the datasheet.)

### BLOCK DIAGRAMS



### SELECTION GUIDES

Halogen Free	Package	Q'ty per Reel	Part No.
H/F	WLCSP-4-P5	5,000 pcs	RP201Zxx1*-TR-F
H/F	DFN(PLP)1212-6	5,000 pcs	RP201Kxx1*-TR

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

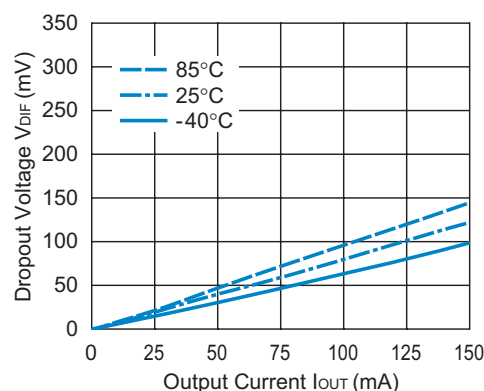
### PACKAGES (Top View)

WLCSP-4-P5	DFN(PLP)1212-6																				
<table> <tr><td>1</td><td><math>V_{DD}</math></td></tr> <tr><td>2</td><td>CE</td></tr> <tr><td>3</td><td>GND</td></tr> <tr><td>4</td><td><math>V_{OUT}</math></td></tr> </table>	1	$V_{DD}$	2	CE	3	GND	4	$V_{OUT}$	<table> <tr><td>1</td><td>AE</td></tr> <tr><td>2</td><td>GND</td></tr> <tr><td>3</td><td>CE</td></tr> <tr><td>4</td><td><math>V_{DD}</math></td></tr> <tr><td>5</td><td>NC</td></tr> <tr><td>6</td><td><math>V_{OUT}</math></td></tr> </table>	1	AE	2	GND	3	CE	4	$V_{DD}$	5	NC	6	$V_{OUT}$
1	$V_{DD}$																				
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3	GND																				
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3	CE																				
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5	NC																				
6	$V_{OUT}$																				

\*) WLCSP-4-P5 does not have AE pin.

### TYPICAL CHARACTERISTIC

RP201x261x 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

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### WHAT IS ECO Function

An increasing number of devices such as mobile phones do not have only talk mode (active mode) and off mode status, but also standby mode (sleep mode) etc.

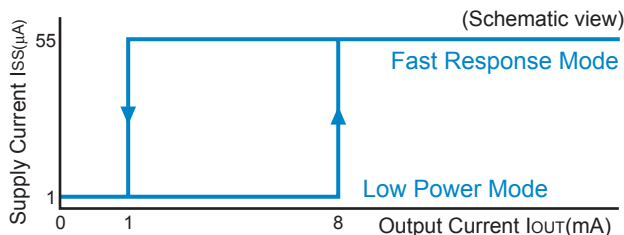
However during the active mode and sleep mode the regulator must satisfy very different requirement. The regulators are required to have fast response and high ripple rejection in the active mode, but consume low supply current in the sleep mode. To satisfy these conflicting requirements, Ricoh's regulators include an ECO function that allows switching between fast mode and low power mode.

There are some types of switching between fast mode and low power mode. As RP201x Series are automatic mode shift types, they can switch the modes automatically depending on system load.

By inputting control signal into the AE pin, the mode of the regulator can be fixed with fast response mode.

#### Automatic Mode Shift

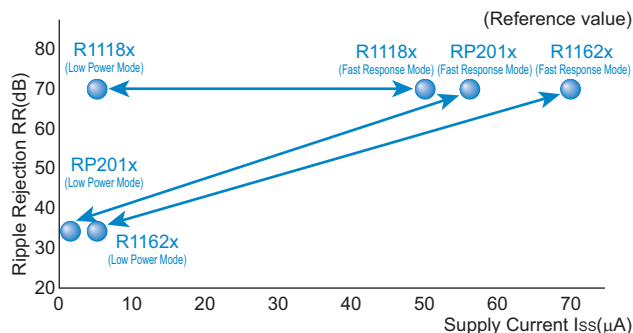
The regulator automatically switches mode depending on system load.



\* To select "H" in AE pin is fixed in fast mode.

\* To select "L" in AE pin is maintained in Automatic Mode Shift.

#### 1μA supply current in low power mode



### 150mA LDO Regulator Comparison

	RP201x	R1162D	R1116x	R1118K
Input voltage Range	1.4V to 5.25V	2.0V to 6.0V	1.8V to 6.0V	1.4V to 6.0V
Output voltage Range	0.8V to 4.0V	1.5V to 4.0V	1.5V to 4.0V	0.8V to 4.2V
Output Voltage Accuracy	±1%	±2%	±1.5%	±1%
Output Current	150mA	150mA	150mA	150mA
Supply Current	55μA (Fast mode) 1.5μA (Low power mode)	70μA (Fast mode) 5.5μA (Low power mode)	10μA	50μA (Fast mode) 5.5μA (Low power mode)
Standby Current	0.1μA	0.1μA	0.1μA	0.1μA
Ripple Rejection	70dB (Fast mode)	70dB (Fast mode)	70dB	70dB (Fast mode)
Output Capacitor	1μF	1μF	1μF	1μF
Dropout Voltage (Typ.)	0.12V (150mA/2.8V)	0.25V (150mA/2.8V)	0.29V (150mA/2.8V)	0.27V (300mA/2.8V)
Line Regulation	0.02%/V	0.02%/V	0.02%/V	0.02%/V
Load regulation	Max.40mV (150mA)	Max.40mV (150mA)	Max.66mV (150mA)	Max.80mV (150mA)
Packages	WLCSP-4-P5 DFN(PLP)1212-6 SOT-23-5	SON1612-6	SON1612-6 SOT-23-5	DFN(PLP)1612-4B
ECO Function	Automatic Mode Shift	Manual Mode Shift	Seamless Type	Automatic Mode Shift

## RICOH COMPANY, 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.



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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