

## LOW NOISE 200mA LDO REGULATOR

Preliminary

NO.EA-

### OUTLINE

The RP100 Series are CMOS-based voltage regulator ICs with high output voltage accuracy, extremely low supply current, low ON-resistance, and high ripple rejection. Each of these ICs consists of a voltage reference unit, an error amplifier, resistor-net for voltage setting, a current limit circuit, and a chip enable circuit.

These ICs perform with low dropout voltage and a chip enable function. The line transient response and load transient response of the RP100 Series are excellent, thus these ICs are very suitable for the power supply for hand-held communication equipment.

The output voltage of these ICs is fixed with high accuracy. Since the packages for these ICs are PLP therefore high density mounting of the ICs on boards is possible.

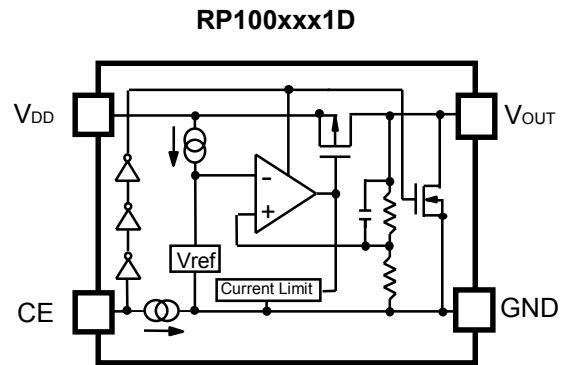
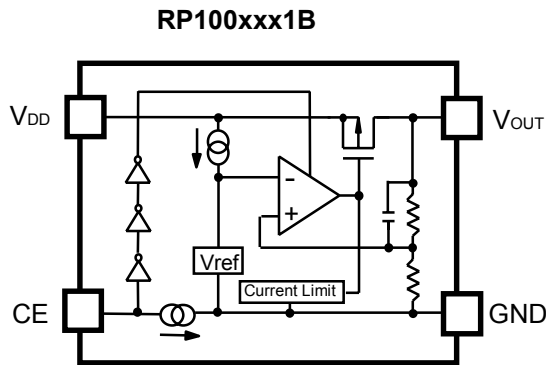
### FEATURES

- Low Supply Current..... Typ. 18 $\mu$ A
- Standby Mode ..... Typ. 0.1 $\mu$ A
- Low Dropout Voltage ..... Typ. 0.14V ( $I_{OUT}=150\text{mA}$  2.5V Output type)
- High Ripple Rejection..... Typ. 75dB ( $f=1\text{kHz}$  2.5V Output type)
- Low Temperature-Drift Coefficient of Output Voltage..... Typ.  $\pm 30\text{ppm}/^\circ\text{C}$
- Excellent Line Regulation..... Typ. 0.02%/V
- High Output Voltage Accuracy.....  $\pm 1.0\%$
- Small Packages..... PLP1612-4, SOT-23-5
- Output Voltage..... 1.2V, 1.5V, 1.8V, 1.85V, 1.9V, 2.0V, 2.5V, 2.6V, 2.7V, 2.8V, 2.85V, 2.9V, 3.0V, 3.3V
- Built-in Fold Back Protection Circuit..... Typ. 40mA (Current at short mode)
- Ceramic capacitors are recommended to be used with this IC ....  $C_{IN}=C_{OUT}=1\mu\text{F}$  or more

### APPLICATIONS

- Power source for portable communication equipment.
- Power source for electrical appliances such as cameras, VCRs and camcorders.
- Power source for battery-powered equipment.

## BLOCK DIAGRAMS



## SELECTION GUIDE

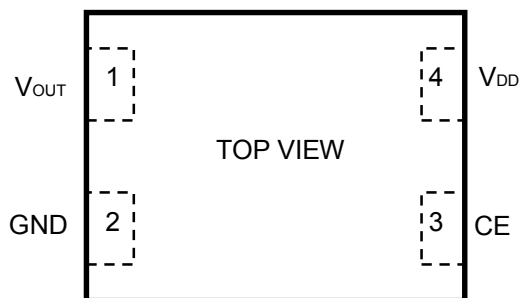
The output voltage, version, and the taping type for the ICs can be selected at the user's request. The selection can be made with designating the part number as shown below;

**RP100xxx1x-xx**      ←Part Number  
 ↑ ↑    ↑ ↑  
 a b    c d

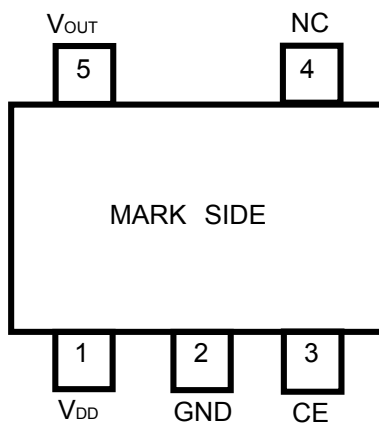
Code	Contents
a	Designation of Package Type: K: PLP1612-4 N: SOT-23-5
b	Setting Output Voltage ( $V_{OUT}$ ): 1.2V, 1.5V, 1.8V, 1.85V, 1.9V, 2.0V, 2.5V, 2.6V, 2.7V, 2.8V, 2.85V, 2.9V, 3.0V, 3.3V
c	Designation of Active Type: B: active high type D: active high, with auto discharge
d	Designation of Taping Type: Ex. TR (refer to Taping Specifications; TR type is the standard direction.)

## PIN CONFIGURATION

● PLP1612-4



● SOT-23-5



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**RP100**

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**PIN DESCRIPTIONS**● **RP100K**

Pin No.	Symbol	Description
1	V <sub>OUT</sub>	Output Pin
2	GND	Ground Pin
3	CE	Chip Enable Pin
4	V <sub>DD</sub>	Input Pin

● **RP100N**

Pin No.	Symbol	Description
1	V <sub>DD</sub>	Input Pin
2	GND	Ground Pin
3	CE	Chip Enable Pin
4	NC	No Connection
5	V <sub>OUT</sub>	Output Pin

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Item	Rating	Unit
V <sub>IN</sub>	Input Voltage	6.0	V
V <sub>CE</sub>	Input Voltage (CE Pin)	6.0	V
V <sub>OUT</sub>	Output Voltage	-0.3~V <sub>IN</sub> +0.3	V
I <sub>OUT</sub>	Output Current	300	mA
P <sub>D</sub>	Power Dissipation *Note1	250	mW
T <sub>opt</sub>	Operating Temperature Range	-40~85	°C
T <sub>stg</sub>	Storage Temperature Range	-55~125	°C

Note1: This value is under evaluation.

Mounted on board. Conditions: Board material FR4, Board dimensions 40\*40\*1.6(mm)

Metal rate: 50%(2-layer) without thermal via holes, wind velocity=0m/s

## ELECTRICAL CHARACTERISTICS

- RP100xxx

- $V_{IN}$  = Set  $V_{OUT} + 1V$ ,  $I_{OUT} = 1mA$ ,  $C_{IN} = C_{OUT} = 1\mu F$ , unless otherwise noted.

$T_{opt} = 25^{\circ}C$

Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
$V_{OUT}$	Output Voltage	(*1)	$V_{OUT} \times 0.99$ (-20mV)		$V_{OUT} \times 1.01$ (20mV)	V
$I_{OUT}$	Output Current		200			mA
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	$1mA \leq I_{OUT} \leq 150mA$		20	40	mV
$V_{DIF}$	Dropout Voltage	$I_{OUT} = 150mA$	$1.2V \leq SET V_{OUT} < 1.5V$	400	500	mV
			$1.5V \leq SET V_{OUT} < 1.7V$	240	380	
			$1.7V \leq SET V_{OUT} < 2.0V$	210	340	
			$2.0V \leq SET V_{OUT} < 2.5V$	170	300	
			$2.5V \leq SET V_{OUT} < 2.8V$	140	250	
			$2.8V \leq SET V_{OUT} \leq 3.3V$	130	230	
$I_{SS}$	Supply Current	$I_{OUT} = 0mA$		18	25	$\mu A$
$I_{standby}$	Supply Current (Standby)	$V_{CE} = 0V$		0.1	2.0	$\mu A$
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	Set $V_{OUT} + 0.5V \leq V_{IN} \leq 5.0V$		0.02	0.10	%/V
RR	Ripple Rejection	$f = 1kHz$ , Ripple 0.2Vp-p $V_{IN} = Set V_{OUT} + 1V$ , $I_{OUT} = 30mA$ (In case that $V_{OUT} \leq 2.0V$ , $V_{IN} = 3V$ )		75		dB
$V_{IN}$	Input Voltage	*(2)	1.7		5.0	V
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	$-40^{\circ}C \leq T_{opt} \leq 85^{\circ}C$		$\pm 30$		ppm/ $^{\circ}C$
$I_{LIM}$	Short Current Limit	$V_{OUT} = 0V$		40		mA
$I_{PD}$	CE Pull-down Current			0.3		$\mu A$
$V_{CEH}$	CE Input Voltage "H"		1.5			V
$V_{CEL}$	CE Input Voltage "L"				0.3	V
en	Output Noise	BW = 10Hz to 100kHz $I_{OUT} = 30mA$		30		$\mu V_{rms}$
$R_{LOW}$	Nch On Resistance for Auto Discharge (D version Only)	$V_{IN} = 4.0V$ , $V_{CE} = 0V$		30		$\Omega$

(\*1)  $V_{out} \leq 2.0V \pm 20mV$  accuracy

(\*2) If  $V_{in} = 5.5V$ , maximum duration time is 500hrs.

## **TECHNICAL NOTES**

When using these ICs, consider the following points:

### **Phase Compensation**

In these ICs, phase compensation is made for securing stable operation even if the load current is varied. For this purpose, use a capacitor  $C_{OUT}$  with good frequency characteristics and ESR (Equivalent Series Resistance). (Note: If additional ceramic capacitors are connected with parallel to the output pin with an output capacitor for phase compensation, the operation might be unstable. Because of this, test these ICs with as same external components as ones to be used on the PCB.)

### **PCB Layout**

Make  $V_{DD}$  and GND lines sufficient. If their impedance is high, noise pickup or unstable operation may result. Connect a capacitor with a capacitance value as much as 1.0 $\mu$ F or more between  $V_{DD}$  and GND pin, and as close as possible to the pins.

Set external components, especially the output capacitor, as close as possible to the ICs, and make wiring as short as possible.