

OUTLINE

The RP102 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 RP102 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 WL-CSP therefore high density mounting of the ICs on boards is possible.

FEATURES

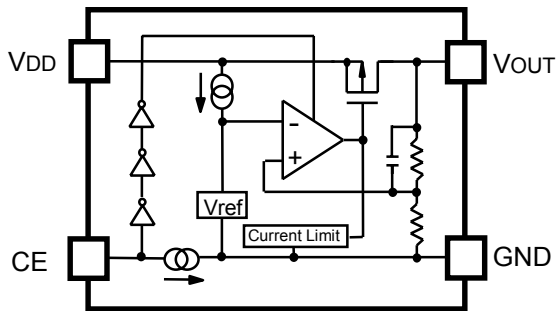
- Low Supply Current..... Typ. 50 μ A
- Standby Mode Typ. 0.1 μ A
- Low Dropout Voltage Typ. 0.12V ($I_{OUT}=300mA$ 3.3V Output type)
Typ. 0.14V ($I_{OUT}=300mA$ 2.5V Output type)
- High Ripple Rejection..... Typ. 80dB ($f=1kHz$ 2.5V Output type)
- Low Temperature-Drift Coefficient of Output Voltage..... Typ. $\pm 20ppm/^{\circ}C$
- Excellent Line Regulation..... Typ. 0.02%/V
- High Output Voltage Accuracy..... $\pm 1.0\%$
- Small Packages WL-CSP, SOT-23-5
- Output Voltage..... 1.2V, 1.5V, 1.8V, 2.5V, 2.6V, 2.8V,
2.85V, 2.9V, 3.0V, 3.3V
- Built-in Fold Back Protection Circuit..... Typ. 50mA (Current at short mode)
- Ceramic capacitors are recommended to be used with this IC..... $C_{IN}=C_{OUT}=1\mu F$ or more

APPLICATIONS

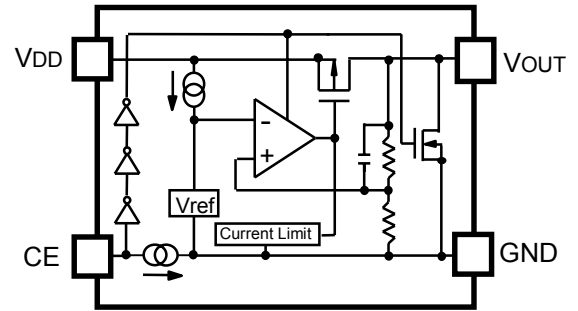
- Power source for portable communication equipment.
- Power source for electrical appliances such as cameras, VCRs and camcorders.
- Power source for battery-powered equipment.

BLOCK DIAGRAMS

RP102xxx1B



RP102xxx1D



SELECTION GUIDE

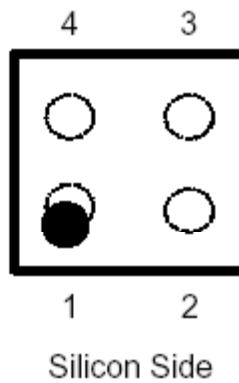
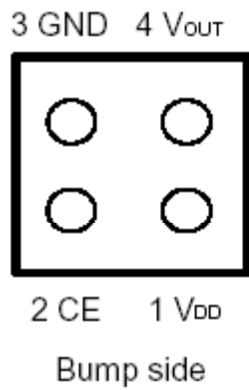
The output voltage, version, and the taping type for the ICs can be selected at the user's request.
 The selection can be made with designating the part number as shown below;

RP102**xxx****1****x-xx** ←Part Number
 ↑ ↑ ↑ ↑
 a b c d

Code	Contents
a	Designation of Package Type: Z:WL-CSP4-P2 N:SOT-23-5
b	Setting Output Voltage (V _{OUT}): 1.2V, 1.5V, 1.8V, 2.5V, 2.6V, 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.)

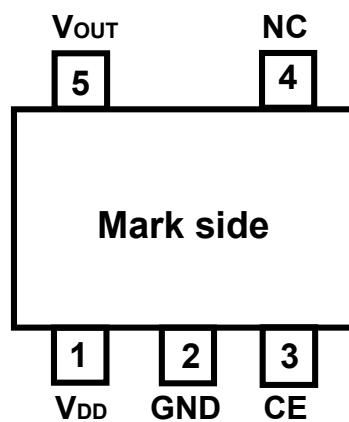
PIN CONFIGURATION

● WL-CSP4-P2



0.79mm X 0.79mm (t=0.48mm)

● SOT-23-5



PIN DESCRIPTIONS

- RP102Z

Pin No.	Symbol	Description
1	V _{DD}	Input Pin
2	CE	Chip Enable Pin
3	GND	Ground Pin
4	V _{OUT}	Output Pin

- RP102N

Pin No.	Symbol	Description
1	V _{DD}	Input Pin
2	GND	Chip Enable Pin
3	CE	Ground Pin
4	NC	No Connection
5	V _{OUT}	Output Pin

ABSOLUTE MAXIMUM RATINGS

Symbol	Item	Rating	Unit
V _{DD}	Input Voltage	6.0	V
V _{CE}	Input Voltage (CE Pin)	6.0	V
V _{OUT}	Output Voltage	-0.3 ~ V _{DD1} +0.3	V
I _{OUT}	Output Current	400	mA
P _D	Power Dissipation	*Note 1	mW
T _{opt}	Operating Temperature Range	-40~85	°C
T _{stg}	Storage Temperature Range	-55~125	°C

Note1: This value is under evaluation.

Measurement Conditions

Test Conditions: Mounted on PCB (Wind velocity 0m/s)

Board Material: FR-4 (Double layer)

Board dimensions : 40mm × 40mm × t1.6mm

Metal Ratio :50%

*Result

ELECTRICAL CHARACTERISTICS

- RP102xxx

- V_{IN} = Set $V_{OUT} + 1V$ for V_{OUT} options greater than 1.5V. $V_{IN} = 2.5V$ for $V_{OUT} \leq 1.5V$. $I_{OUT} = 1mA$, $C_{IN} = C_{OUT} = 1\mu F$, unless otherwise noted.

T_{opt} = 25°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		300			mA
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	$1mA \leq I_{OUT} \leq 150mA$		10	40	mV
V_{DIF}	Dropout Voltage	Please see the data sheet below				
I_{SS}	Supply Current	$I_{OUT} = 0mA$		50	70	μA
$I_{standby}$	Supply Current (Standby)	$V_{CE} = 0V$		0.1	2.0	μA
$\Delta V_{OUT}/\Delta V_{IN}$	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 $V_{IN} = \text{Set } V_{OUT} + 1V$, $I_{OUT} = 30mA$ (In case that $V_{OUT} \leq 2.0V$, $V_{IN} = 3V$)		80		dB
V_{DD}	Input Voltage	(*2)	1.7		5.0	V
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	$-40^\circ C \leq T_{opt} \leq 85^\circ C$		± 20		ppm/ $^\circ C$
I_{LIM}	Short Current Limit	$V_{OUT} = 0V$		50		mA
I_{PD}	CE Pull-down Current		0.05	0.3	0.6	μA
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		μV_{rms}
R _{low}	Nch On Resistance For auto discharge (D version)	$V_{IN} = 4.0V$ $V_{CE} = 0V$		30		Ω

(*1) $V_{out} \leq 2.0V$ $\pm 20mV$ accuracy(*2) $V_{in} = 5.5V$ duration time is 500hrs.

- Dropout Voltage

V_{OUT} (V)	Dropout Voltage					
	Condition	TYP.	MAX.	Condition	TYP.	MAX.
$1.2V \leq V_{OUT} < 1.5V$	$I_{OUT} = 150mA$	145	500	$I_{OUT} = 300mA$	290	500
$1.5V \leq V_{OUT} < 1.7V$		110	160		220	320
$1.7V \leq V_{OUT} < 2.0V$		100	140		200	280
$2.0V \leq V_{OUT} < 2.5V$		85	120		170	240
$2.5V \leq V_{OUT} < 2.8V$		70	100		140	200

$2.8V \leq V_{OUT} \leq 3.3V$		60	95		120	190
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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.