

Super-mini package regulator IC

BA○○○LBSG series

The BA○○○LBSG (the “○○○” indicates the output voltage value) is a low-saturation series regulator IC employing the super-mini mold package of the SMP5 (2916 package). Equipped with a power-saving function that reduces current consumption, it also offers outstanding ripple rejection and other characteristics, and is ideal for cellular telephones and other compact telephones.

● Applications

Residential / industrial device power supplies for cellular telephones such as the CDMA and GSM, and for other portable communication devices

● Features

- 1) Internal output transistor ($I_o = 150\text{mA}$)
- 2) Internal temperature protection circuit
- 3) Power-saving function enables designs with low current consumption
- 4) High level of ripple rejection (R.R. = 66dB)
- 5) SMP5 super-mini package enables space-saving designs
- 6) Low I / O voltage differential (90mV Typ. at $I_o = 50\text{mA}$)

● Super-mini regulator lineup

Series	Output voltage (V)								
	2.8	2.9	3.0	3.2	3.3	3.6	3.8	4.0	5.0
BA○○○LBSG	○	○	○	○	○	☆	○	☆	☆

* “○○○” indicates the output voltage value. (Example: For 2.8V output, BA028LBSG)
A star indicates a product under development.

● Absolute maximum ratings ($T_a = 25^\circ\text{C}$)

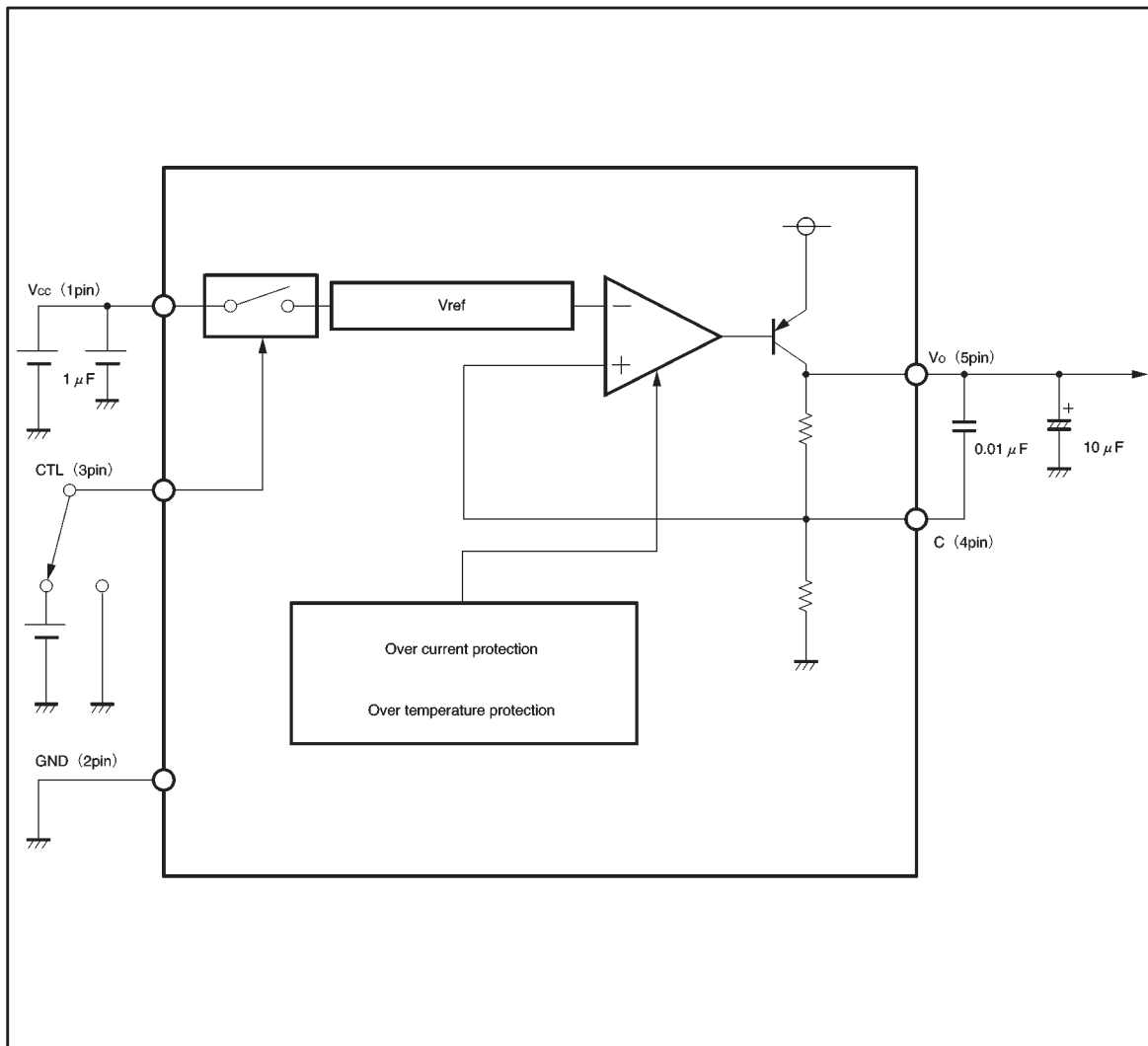
Parameter	Symbol	Limits	Unit
Applied voltage	Vcc	9	V
Power dissipation	Pd	170*	mW
Operating temperature	Topr	-40~+85	°C
Storage temperature	Tstg	-55~+125	°C

* Reduced by 1.7mW for each increase in T_a of 1°C over 25°C

● Recommended operating conditions ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Limits	Unit
Operating power supply voltage	Vcc (input)	2.5~7.0	V

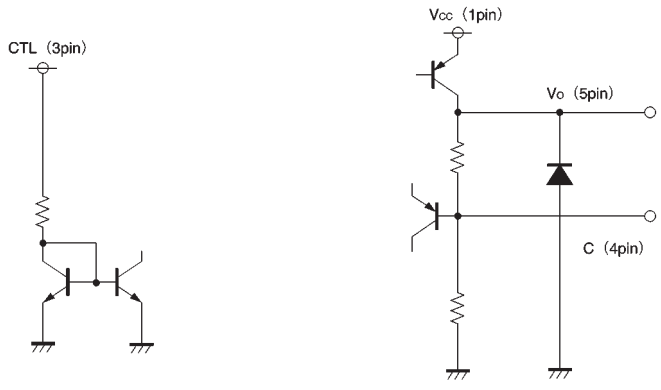
● Block diagram



● Pin descriptions

Pin No.	Pin name	Function
1	Vcc	Power supply
2	GND	Ground
3	CTL	Power - save function
4	C	Ripple improvement
5	OUT	Output

● Input / output circuits



● Electrical characteristics

BA028LBSG (unless otherwise noted, $T_a = 25^\circ\text{C}$, $V_{CC} = 3.8\text{V}$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Coniditions
Standby current	I _{ccs}	—	0	10	μA	V _{ctl} =0V
Circuit current	I _{cca}	—	65	150	μA	V _{ctl} =3V, no output load
〈Output block〉						
Output voltage	V _o	2.73	2.80	2.87	V	I _o =50mA*1
Dropout voltage	ΔV_d	—	90	150	mV	I _o =50mA, V _{cc} =0.95V _o
Output current capability	I _o	150	280	—	mA	—
Load regulation	Reg.L	—	40	80	mV	I _o =1~50mA*1
Input regulation	Reg.I	—	3	30	mV	I _o =10mA, V _{cc} =3.8~7V*1
Output noise voltage	e _n	—	56	—	nV	I _o =10mA, C=0.01 μF *2
Ripple rejection 1	R.R1	45	58	—	dB	I _o =10mA, f=400Hz
Ripple rejection 2	R.R2	—	66	—	dB	I _o =10mA, f=400Hz, C=0.01 μF *2
〈Power-save block〉						
CTL OFF voltage	V _{off}	—	—	0.6	V	—
CTL ON voltage	V _{on}	2.4	—	—	V	—
CTL inflow current	I _{ctl}	—	6.0	15	μA	V _{ctl} =3V

*1 In order to measure at $T_a \rightleftharpoons T_j$ (pulse measurement), fluctuations in output resulting from temperature fluctuations are not included.

*2 Design guaranteed. (Not all products have been inspected.)

A capacitor (0.01 μF) is used between pin 4 and pin 5, to improve ripple rejection.

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BA030LBSG (unless otherwise noted, Ta = 25°C, Vcc = 4.0V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Coniditions
Standby current	Iccs	—	0	10	μA	Vctl=0V
Circuit current	Icca	—	65	150	μA	Vctl=3V, no output load
〈Output block〉						
Output voltage	Vo	2.925	3.00	3.075	V	Io=50mA*1
Dropout voltage	ΔVd	—	90	150	mV	Io=50mA, Vcc=0.95Vo
Output current capability	Io	150	280	—	mA	—
Load regulation	Reg.L	—	40	80	mV	Io=1~50mA*1
Input regulation	Reg.I	—	3	30	mV	Io=10mA, Vcc=4.0~7V*1
Output noise voltage	en	—	56	—	nV	Io=10mA, C=0.01 μF*2
Ripple rejection 1	R.R1	45	58	—	dB	Io=10mA, f=400Hz
Ripple rejection 2	R.R2	—	66	—	dB	Io=10mA, f=400Hz, C=0.01 μF*2
〈Power -save block〉						
CTL OFF voltage	Voff	—	—	0.6	V	—
CTL ON voltage	Von	2.4	—	—	V	—
CTL inflow current	Ictl	—	6.0	15	μA	Vctl=3V

*1 In order to measure at Ta ≒ Tj (pulse measurement), fluctuations in output resulting from temperature fluctuations are not included.

*2 Design guaranteed. (Not all products have been inspected.)

A capacitor (0.01 μF) is used between pin 4 and pin 5, to improve ripple rejection.

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BA032LBSG (unless otherwise noted, $T_a = 25^\circ\text{C}$, $V_{CC} = 4.2\text{V}$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Coniditions
Standby current	I _{ccs}	—	0	10	μA	V _{ctl} =0V
Circuit current	I _{cca}	—	65	150	μA	V _{ctl} =3V, no output load
〈Output block〉						
Output voltage	V _o	3.12	3.20	3.28	V	I _o =50mA*1
Dropout voltage	ΔV _d	—	90	150	mV	I _o =50mA, V _{cc} =0.95V _o
Output current capability	I _o	150	280	—	mA	—
Load regulation	Reg.L	—	40	80	mV	I _o =1~50mA*1
Input regulation	Reg.I	—	3	30	mV	I _o =10mA, V _{cc} =4.2~7V*1
Output noise voltage	e _n	—	56	—	nV	I _o =10mA, C=0.01 μF*2
Ripple rejection 1	R.R1	45	58	—	dB	I _o =10mA, f=400Hz
Ripple rejection 2	R.R2	—	66	—	dB	I _o =10mA, f=400Hz, C=0.01 μF*2
〈Power-save block〉						
CTL OFF voltage	V _{off}	—	—	0.6	V	—
CTL ON voltage	V _{on}	2.4	—	—	V	—
CTL inflow current	I _{ctl}	—	6.0	15	μA	V _{ctl} =3V

*1 In order to measure at $T_a \rightleftharpoons T_j$ (pulse measurement), fluctuations in output resulting from temperature fluctuations are not included.

*2 Design guaranteed. (Not all products have been inspected.)

A capacitor (0.01 μF) is used between pin 4 and pin 5, to improve ripple rejection.

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BA038LBSG (unless otherwise noted, Ta = 25°C, Vcc = 4.8V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Coniditions
Standby current	Iccs	—	0	10	μA	Vctl=0V
Circuit current	Icca	—	65	150	μA	Vctl=3V, no output load
〈Output block〉						
Output voltage	Vo	3.705	3.80	3.895	V	Io=50mA*1
Dropout voltage	ΔVd	—	90	150	mV	Io=50mA, Vcc=0.95Vo
Output current capability	Io	150	280	—	mA	—
Load regulation	Reg.L	—	40	80	mV	Io=1~50mA*1
Input regulation	Reg.I	—	3	30	mV	Io=10mA, Vcc=4.8~7V*1
Output noise voltage	en	—	56	—	nV	Io=10mA, C=0.01 μF*2
Ripple rejection 1	R.R1	45	56	—	dB	Io=10mA, f=400Hz
Ripple rejection 2	R.R2	—	66	—	dB	Io=10mA, f=400Hz, C=0.01 μF*2
〈Power -save block〉						
CTL OFF voltage	Voff	—	—	0.6	V	—
CTL ON voltage	Von	2.4	—	—	V	—
CTL inflow current	Ictl	—	6.0	15	μA	Vctl=3V

*1 In order to measure at Ta ≒ Tj (pulse measurement), fluctuations in output resulting from temperature fluctuations are not included.

*2 Design guaranteed. (Not all products have been inspected.)

A capacitor (0.01 μF) is used between pin 4 and pin 5, to improve ripple rejection.

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● Application example

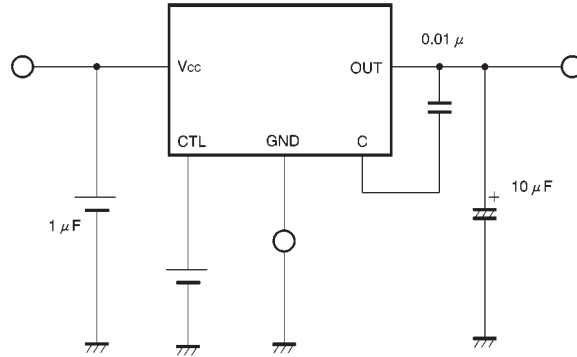


Fig.1

● Electrical characteristic curves (BA030LBSG)

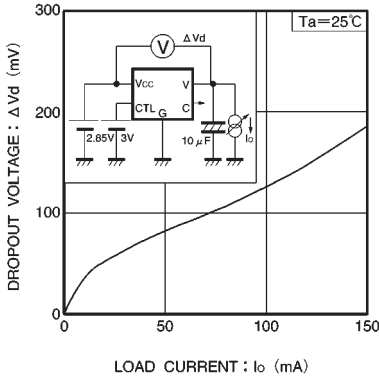


Fig.2 ΔV_d vs. I_o

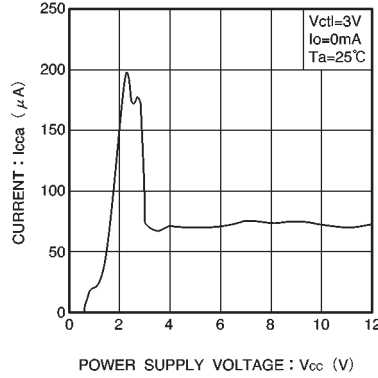


Fig.3 I_{cca} vs. V_{cc}

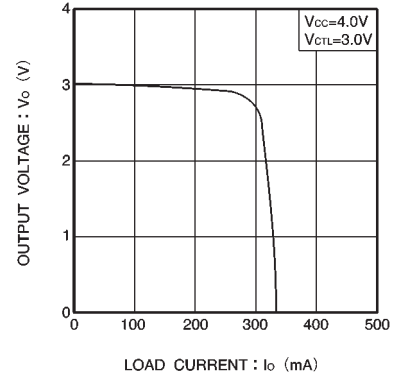


Fig.4 I_o vs. V_o

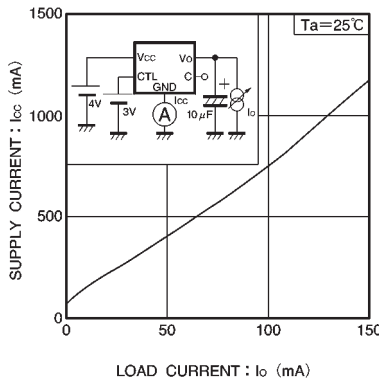


Fig.5 I_{cc} vs. I_o

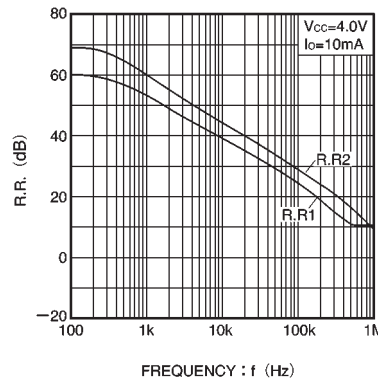


Fig.6 R.R. vs. f characteristics

● External dimensions (Units: mm)

