

Super-mini package regulator IC

BAOOOLBSG series

The BAOOOLBSG (the "OOO" 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 characteristics, and is ideal for cellular telephones and other.

● Applications

Residential / industrial device power supplies for cellular telephone such as the CDMA and GSM, and for other portable.

● Features

- 1) Internal output transistor ($I_o=150mA$)
- 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 $I_o=50mA$)

● 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
BAOOOLBSG	○	○	○	○	○	○	○	○	○

* "OOO" indicates the output voltage value. (Example : For 2.8V output, BA028LBSG)

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

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

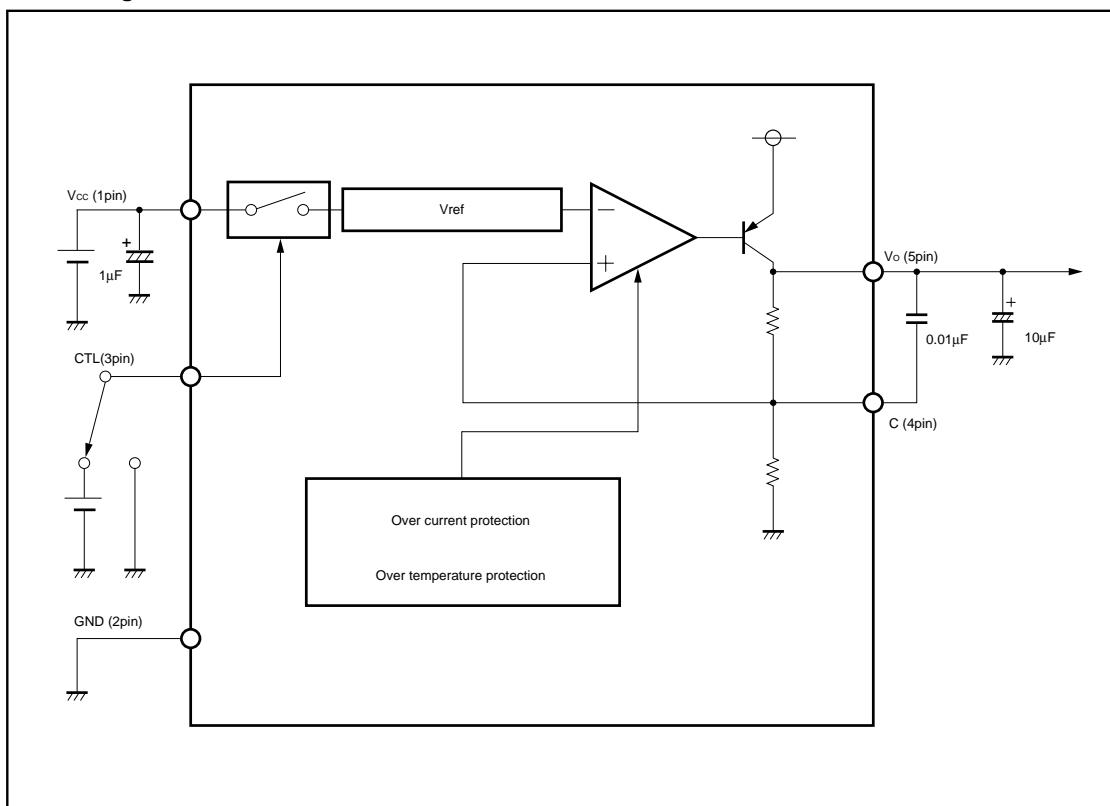
* Reduced by 1.7mW for each increase in T_a of 1°C over 25°C

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

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

Regulator IC

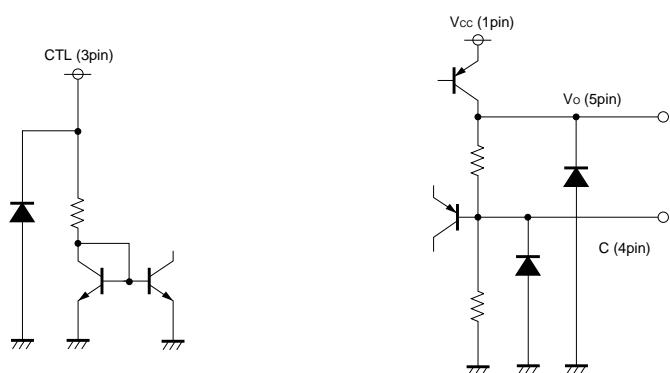
●Block diagram



●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



Regulator IC

●Electrical characteristics

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Standby current	I_{ccs}	-	0	10	μA	$V_{ctl}=0V$
Circuit current	I_{ccs}	-	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	$I_o=1\sim50mA^{*1}$
Input regulation	Reg.I	-	3	30	mV	$I_o=10mA$, $V_{cc}=3.8\sim7V^{*1}$
Output noise voltage	en	-	56	-	μV	$I_o=10mA$, $C=0.01\mu F^{*2}$
Ripple rejection 1	R.R1	50	58	-	dB	$I_o=10mA$, $f=400Hz$
Ripple rejection 2	R.R2	-	66	-	dB	$I_o=10mA$, $f=400Hz$, $C=0.01\mu F^{*2}$
<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	$V_{ctl}=3V$

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

* 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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BA029LBSG (unless otherwise noted, $T_a=25^\circ C$, $V_{cc}=3.9V$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Standby current	I_{ccs}	-	0	10	μA	$V_{ctl}=0V$
Circuit current	I_{ccs}	-	65	150	μA	$V_{ctl}=3V$, no output load
<Output block>						
Output voltage	V_o	2.828	2.90	2.973	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	$I_o=1\sim50mA^{*1}$
Input regulation	Reg.I	-	3	30	mV	$V_{cc}=3.9\sim7V$
Output noise voltage	en	-	56	-	μV	$I_o=10mA$, $C=0.01\mu F^{*2}$
Ripple rejection 1	R.R1	45	58	-	dB	$I_o=10mA$, $f=400Hz$
Ripple rejection 2	R.R2	-	66	-	dB	$I_o=10mA$, $f=400Hz$, $C=0.01\mu F^{*2}$
<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	$V_{ctl}=3V$

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Regulator IC

BA030LBSG (unless otherwise noted, $T_a=25^\circ C$, $V_{cc}=4.0V$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Standby current	I_{ccs}	-	0	10	μA	$V_{ctl}=0V$
Circuit current	I_{ccs}	-	65	150	μA	$V_{ctl}=3V$, no output load
<Output block>						
Output voltage	V_o	2.925	3.00	3.075	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	$I_o=1\sim50mA^{*1}$
Input regulation	Reg.I	-	3	30	mV	$I_o=10mA$, $V_{cc}=4.0\sim7V^{*1}$
Output noise voltage	en	-	56	-	μV	$I_o=10mA$, $C=0.01\mu F^{*2}$
Ripple rejection 1	R.R1	50	58	-	dB	$I_o=10mA$, $f=400Hz$
Ripple rejection 2	R.R2	-	66	-	dB	$I_o=10mA$, $f=400Hz$, $C=0.01\mu F^{*2}$
<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	$V_{ctl}=3V$

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

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Standby current	I_{ccs}	-	0	10	μA	$V_{ctl}=0V$
Circuit current	I_{ccs}	-	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	$I_o=1\sim50mA^{*1}$
Input regulation	Reg.I	-	3	30	mV	$I_o=10mA$, $V_{cc}=4.2\sim7V^{*1}$
Output noise voltage	en	-	56	-	μV	$I_o=10mA$, $C=0.01\mu F^{*2}$
Ripple rejection 1	R.R1	50	58	-	dB	$I_o=10mA$, $f=400Hz$
Ripple rejection 2	R.R2	-	66	-	dB	$I_o=10mA$, $f=400Hz$, $C=0.01\mu F^{*2}$
<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	$V_{ctl}=3V$

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

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Regulator IC

BA033LBSG (unless otherwise noted, $T_a=25^\circ C$, $V_{cc}=4.3V$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Standby current	I_{ccs}	-	0	10	μA	$V_{ctl}=0V$
Circuit current	I_{ccs}	-	65	150	μA	$V_{ctl}=3V$, no output load
<Output block>						
Output voltage	V_o	3.218	3.30	3.382	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	$I_o=1\sim50mA^{*1}$
Input regulation	Reg.I	-	3	30	mV	$V_{cc}=4.3\sim7V$
Output noise voltage	en	-	56	-	μV	$I_o=10mA$, $C=0.01\mu F^{*2}$
Ripple rejection 1	R.R1	45	58	-	dB	$I_o=10mA$, $f=400Hz$
Ripple rejection 2	R.R2	-	66	-	dB	$I_o=10mA$, $f=400Hz$, $C=0.01\mu F^{*2}$
<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	$V_{ctl}=3V$

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

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BA036LBSG (unless otherwise noted, $T_a=25^\circ C$, $V_{cc}=4.6V$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Standby current	I_{ccs}	-	0	10	μA	$V_{ctl}=0V$
Circuit current	I_{ccs}	-	65	150	μA	$V_{ctl}=3V$, no output load
<Output block>						
Output voltage	V_o	3.51	3.60	3.69	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	$I_o=1\sim50mA^{*1}$
Input regulation	Reg.I	-	3	30	mV	$V_{cc}=4.6\sim7V$
Output noise voltage	en	-	56	-	μV	$I_o=10mA$, $C=0.01\mu F^{*2}$
Ripple rejection 1	R.R1	45	56	-	dB	$I_o=10mA$, $f=400Hz$
Ripple rejection 2	R.R2	-	66	-	dB	$I_o=10mA$, $f=400Hz$, $C=0.01\mu F^{*2}$
<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	$V_{ctl}=3V$

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

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Regulator IC

BA038LBSG (unless otherwise noted, $T_a=25^\circ C$, $V_{cc}=4.8V$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
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	3.705	3.80	3.895	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	$I_o=1\sim50mA^{*1}$
Input regulation	Reg.I	-	3	30	mV	$I_o=10mA$, $V_{cc}=4.8\sim7V^{*1}$
Output noise voltage	en	-	56	-	μV	$I_o=10mA$, $C=0.01\mu F^{*2}$
Ripple rejection 1	R.R1	50	56	-	dB	$I_o=10mA$, $f=400Hz$
Ripple rejection 2	R.R2	-	66	-	dB	$I_o=10mA$, $f=400Hz$, $C=0.01\mu F^{*2}$
<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	$V_{ctl}=3V$

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

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BA040LBSG (unless otherwise noted, $T_a=25^\circ C$, $V_{cc}=5.0V$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
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	3.90	4.00	4.10	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	$I_o=1\sim50mA^{*1}$
Input regulation	Reg.I	-	3	30	mV	$V_{cc}=5.0\sim7V$
Output noise voltage	en	-	56	-	μV	$I_o=10mA$, $C=0.01\mu F^{*2}$
Ripple rejection 1	R.R1	45	56	-	dB	$I_o=10mA$, $f=400Hz$
Ripple rejection 2	R.R2	-	66	-	dB	$I_o=10mA$, $f=400Hz$, $C=0.01\mu F^{*2}$
<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	$V_{ctl}=3V$

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

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Regulator IC

BA050LBSG (unless otherwise noted, $T_a=25^\circ C$, $V_{cc}=6.0V$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
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	4.875	5.00	5.125	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	$I_o=1\sim50mA$ *1
Input regulation	Reg.I	-	3	30	mV	$V_{cc}=6.0\sim7V$
Output noise voltage	en	-	56	-	μV	$I_o=10mA$, $C=0.01\mu F$ *2
Ripple rejection 1	R.R1	45	54	-	dB	$I_o=10mA$, $f=400Hz$
Ripple rejection 2	R.R2	-	66	-	dB	$I_o=10mA$, $f=400Hz$, $C=0.01\mu F$ *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	$V_{ctl}=3V$

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

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●Application example

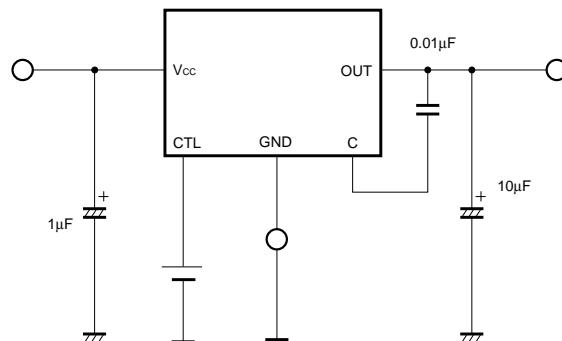


Fig.1

Regulator IC

● Electrical characteristic curves (BA030LBSG)

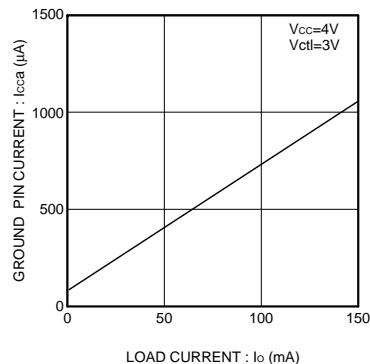


Fig.2 I_{cc} vs. I_o

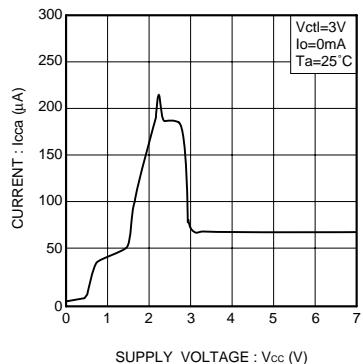


Fig.3 I_{cc} vs. V_{cc}

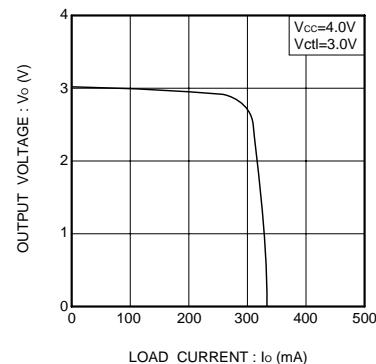


Fig.4 I_o vs. V_o

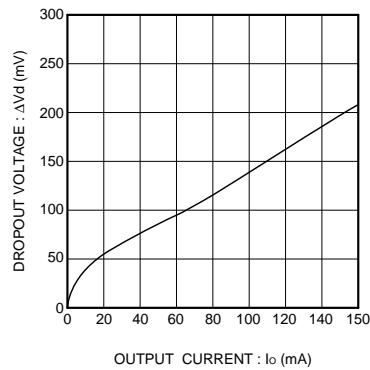


Fig.5 ΔV vs. I_o

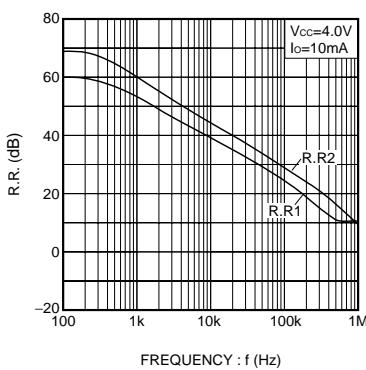
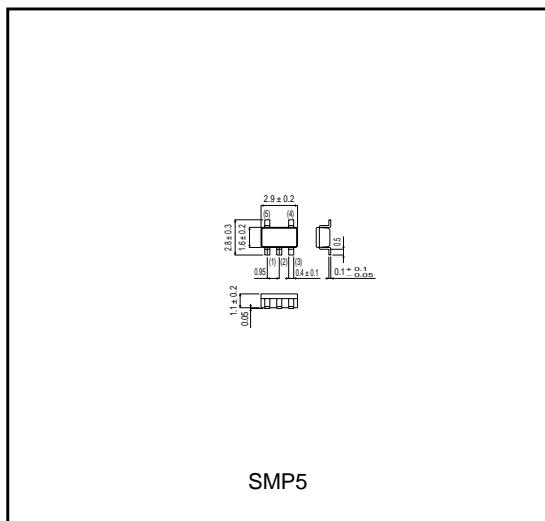


Fig.6 R.R. vs. f characteristics

● External dimensions (Units : mm)



Appendix

Notes

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