ROHM

STRUCTURE Silicon Monolithic Integrated circuit

TYPE 1.0A Low-Dropout Voltage Regulator with Shut down Switch

PRODUCT SERIES B A X X B C 0 W F P

FEATURES
- ･Maximum Output Current : 1A
- ･High Precision Output Voltage : ±2%

○ABSOLUTE MAXIMUM RATINGS (Ta=25℃)

Parameter	Symbol	Limits	Unit
Supply Voltage ※1	Vcc	-0.3～18.0	V
Control Input Voltage	VCTL	-0.3～Vcc	V
Power dissipation ※2	Pd	1300	mW
Operating temperature range	Topr	-40～105	℃
Power dissipation	Tstg	-55～+150	℃
Junction temperature	Tjmax	150	℃

※1 Do not however exceed Pd.
※2 Derating in done at 10.4mW/℃ for operating above Ta=25℃.

○OPERATING CONDITIONS (Ta=-40～105℃, Do not however exceed Pd.)

Parameter	Symbol	Min	Max	Unit
Input Voltage	Vcc	3.0	16.0	V
Output current	Io	-	1.0	A
Control Pin Input Voltage	Vctl	0	Vcc	V

※3 When Output voltage is 1.5V, 1.8V, 2.5V ,Vccmin=3.0V
When Output voltage is over 3.0V, Vccmin=Vo+1.0V

NOTE : The product described in this specification is a strategic product (and/or service) subject to COCOM regulations. It should not be exported without authorization from the appropriate government.
NOTE : This product is not designed for protection against radioactive rays.

Status of this document
The Japanese version of this document is the formal specification.
A customer may use this translation version only for a reference to help reading the formal version.
If there are any differences in translation version of this document, formal version takes priority.

○ELECTRICAL CHARACTERISTICS

Unless otherwise specified, Ta=25℃, Vcc=3.3V(Vo=1.5V,1.8V,2.5V), Vcc=5.0V(Vo=3.0V,3.3V), Vcc=Vo+3.0V(Vo≧5.0V)

Parameter	Symbol	Limit Min.	Limit Typ.	Limit Max	Unit	Conditions
Shut Down Current	Isd	−	0	10	μA	Vctl=OV, Io=0mA (OFF MODE)
Bias Current	Ib	−	0.5	0.9	mA	Io=0mA(Vo≦6.0V)
		−	0.6	1.0	mA	Io=0mA(Vo≧7.0V)
Output Voltage	Vo	Vo(T)×0.98	Vo(T)	Vo(T)×1.02	V	Io=200mA
Dropout Voltage ※4	ΔVd	−	0.3	0.5	V	Io=500mA, Vcc=Vo×0.95V
Peak Output Current	Io	1.0	−	−	A	
Ripple Rejection	R.R.	44	55	−	dB	f=120Hz, ein ※6=4-20dBV, Io=100mA
Line Regulation	Reg.I	−	15	35	mV	Vcc=Vccmin→16V, Io=200mA
Load Regulation	Reg.L	−	35	75	mV	Io=0mA→1A
Temperature Coefficient of Output Current ※5	Tcvo	−	±0.02	−	%/℃	Io=5mA,Tj=0～125℃
Output Short Current	Ios	−	0.21	−	A	Vcc=16V(Vo=1.5V)
		−	0.25	−		Vcc=16V(1.8≦Vo≦3.3)
		−	0.30	−		Vcc=16V(Vo≧5.0V)
ON Mode Voltage	Vth1	2.0	−	−	V	ACTIVE MODE, Io=0mA
OFF Mode Voltage	Vth2	−	−	0.8	V	OFF MODE, Io=0mA
Input High Current	Iin	40	80	130	μA	Io=0mA

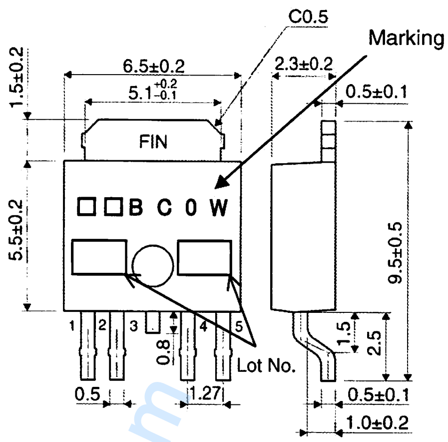
Vo(T): Output Voltage

※4 Vo≧3.3V

※5 Designed Guarantee. (Outgoing inspection is not done on all products.)

※6 ein=Input Voltage Ripple

○PHYSUCAL DIMENSIONS, MARKING



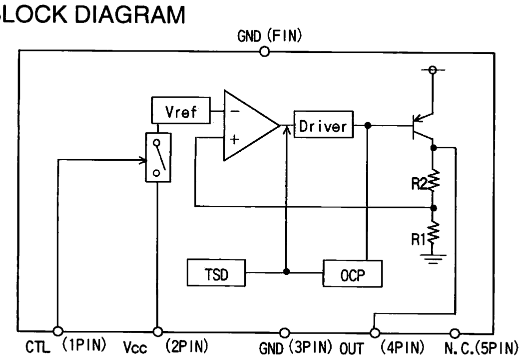
TO252-5 (UNIT : mm)

○OUTPUT VOLTAGE, MARKING

Parts Number	Marking	Output Voltage (V)
BA15BC0WFP	15BC0W	1.5
BA18BC0WFP	18BC0W	1.8
BA25BC0WFP	25BC0W	2.5
BA30BC0WFP	30BC0W	3.0
BA33BC0WFP	33BC0W	3.3
BA50BC0WFP	50BC0W	5.0

Parts Number	Marking	Output Voltage (V)
BA60BC0WFP	60BC0W	6.0
BA70BC0WFP	70BC0W	7.0
BA80BC0WFP	80BC0W	8.0
BA90BC0WFP	90BC0W	9.0
BAJ0BC0WFP	J0BC0W	10.0

○BLOCK DIAGRAM



○PIN NO. , PIN NAME

Pin No.	Pin Name
1	CTL
2	Vcc
3	N.C.
4	OUT
5	N.C.
FIN	GND

※ Please refer to technical note concerning application circuit, and etc.

○NOTES FOR USE

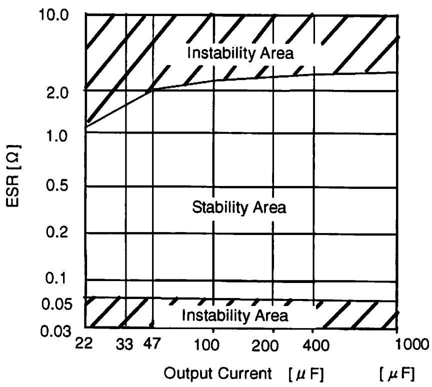
1. Absolute maximum range
Absolute Maximum Ratings are those values beyond which the life of a device may be destroyed we cannot be defined the failure mode, such as short mode or open mode.
Therefore physical security countermeasure, like fuse, is to be given when a specific mode to be beyond absolute maximum ratings is considered.

2. GND pin voltage
GND terminal should be connected the lowest voltage, under all conditions. And all terminals except GND should be under GND terminal voltage under all conditions including transient situations.

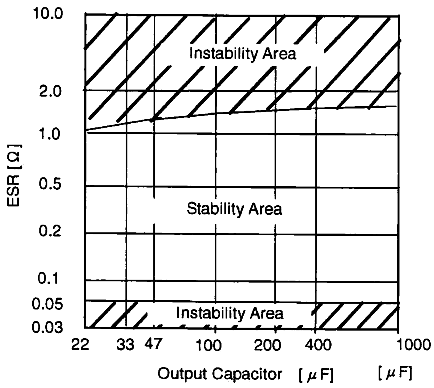
3. Power dissipation
If IC is used on condition that the power loss is over the power dissipation, the reliability will become worse by heat up, such as reduced output current capability.
Also, be sure to use this IC within a power dissipation range allowing enough of margin.

4. Electrical characteristics described in these specifications may vary, depending on temperature, supply voltage, external circuits and other conditions. Therefore, be sure to check all relevant factors, including transient characteristics.

5. Be sure to connect a capacitor with capacitance of at least 22μF, including temperature characteristics and variation, to prevent oscillation between the Vo and GND. Note that if the capacity of the capacitor changes due to factors such as changes in temperature or ESR, oscillation may occur, and the original characteristics of the IC may not be realized. For example, when a ceramic capacitor is employed, oscillation will be generated because the series resistance is too small. Please take countermeasures to prevent this, such as adding a series resistor. Standard electrolytic capacitors are subject to extremely large capacitance and ESR fluctuations due to temperature conditions. Particularly at low temperature, capacity is decreased, while ESR grows larger, conditions which increase the vulnerability to oscillation. Therefore, be certain to check for the presence of oscillation.
In respect to the proper ESR range, select a capacitor that meets the conditions in the figure below for stable operation range. Note, however, that the stable range suggested in the figure depends on the IC and the resistance load involved, and can vary with the board's wiring impedance, input impedance, and/or load impedance. Therefore, be certain to ascertain the final status of these items for actual use.
Keep capacitor capacitance within a range of 22μF～1000μF. It is also recommended that a 0.33μF bypass capacitor be connected as close to the input pin-GND as location possible. However, in situations such as rapid fluctuation of the input voltage or the load, please check the operation in real application to determine proper capacitance.



Stability Area (Output Current : Io=50mA～250mA)



Stability Area (Output Current : Io=250mA～1000mA)

6. Overcurrent protection circuit
The built-in overcurrent protection circuit is designed to respond to the output current and prevent destruction of the IC from load short circuits; however, it is only effective in protecting the IC from destruction in sudden overcurrent accidents. The protection circuit is not to be used continuously, or for transitions. In executing thermal design, bear in mind that overcurrent protection has negative characteristic according with the temperature.

7. Thermal shutdown circuit
A built-in internal shutdown (TSD) circuit is provided to protect the IC from heat destruction. Operation has to be done within the allowable loss range, but in continuous use beyond the range, chip temperature Tj will increase to the threshold, activating the TSD circuit and turning the output power Tr OFF. Once the chip temperature Tj returns to the normal range, the circuit is automatically restored. Note that the TSD circuit is designed to operate over the maximum absolute rating. Therefore, make absolutely certain not to use the TSD function in set design.

8. Mounting Failures
Mounting failure, such as misdirection or mismount, may cause a malfunction in the device.

9. Internal circuits or elements may be damaged when Vcc and pin voltage are reversed. For example, Vcc short circuit to GND while a external capacitor is charged. Output pin capacitor is recommended no larger than 1000μF. In addition, inserting a Vcc series countercurrent prevention diode, or a bypass diode between the various pins and the vcc, is recommended.

10. Malfunction may be happened when the device is used in the strong electromagnetic field.

11. We recommend to put Diode for protection purpose in case of output pin connected with large load of impedance or reserve current occurred at initial and output off.

12. Precautions for board inspection
Connecting low-impedance capacitors to run inspections with the board may produce stress on the IC. Therefore, be certain to use proper discharge procedure before each process of the test operation. To prevent electrostatic accumulation and discharge in the assembly process, thoroughly ground yourself and any equipment that could sustain ESD damage, and continue observing ESD-prevention procedures in all handling, transfer and storage operations. Before attempting to connect components to the test setup, make certain that the power supply is OFF. Likewise, be sure the power supply is OFF before removing any component connected to the test setup.

13. GND pattern
When both a small-signal GND and high current GND are present, single-point grounding (at the set standard point) is recommended, in order to separate the small-signal and high current patterns, and to be sure the voltage change stemming from the wiring resistance and high current does not cause any voltage change in the small-signal GND. In the same way, care must be taken to avoid voltage fluctuations in any connected external component GND.

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As of 18th. April 2005