

**STRUCTURE TYPE** Silicon Monolithic Integrated Circuit  
 Dual Low-Dropout Voltage Regulator  
**PRODUCT SERIES** **BA33D18HFP**  
**FEATURES**

- Dual Output : 3.3V/0.5A, 1.8 V/0.5A
- Output Voltage Accuracy :  $\pm 2\%$

○ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Parameter	Symbol	Limits	Unit
Supply Voltage *1	Vcc	18	V
Power Dissipation *2	Pd	2300	mW
Operating Temperature Range	Topr	-25~+105	°C
Storage Temperature Range	Tstg	-55~+150	°C

\*1 Do not however exceed Pd.

\*2 Pd derated at 18.4mW/°C for temperature above Ta=25°C, Mounted on 70mm×70mm×1.6mm Glass Epoxy PCB.

The PCB has Thermal Via and 2Layers. The front side Copper Area : 10.5×10.5mm<sup>2</sup>, The back side Copper Area : 15×15mm<sup>2</sup>

○ OPERATING CONDITIONS (Ta=25°C)

Parameter	Symbol	Min.	Max.	Limit
Supply Voltage	Vcc	4.1	16.0	V
3.3V Peak Output Current	Io1	-	0.5	A
1.8V Peak Output Current	Io2	-	0.5	A

\* This product is not designed for protection against radioactive rays.

\* 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.

\* 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.

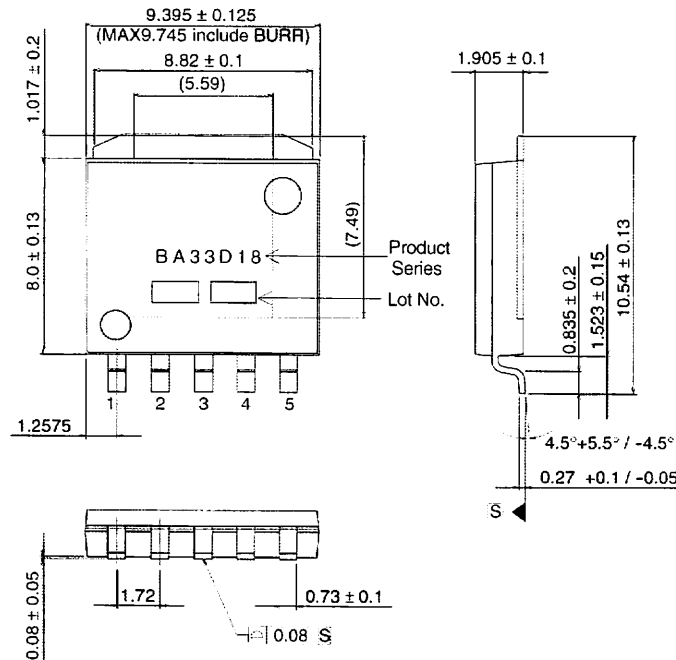
If there are any differences in translation version of this document, formal version takes priority.

○ ELECTRICAL CHARACTERISTICS (Unless otherwise specified Ta=25°C, Vcc=5V)

Parameter	Symbol	Limits			Unit	Condition
		Min.	Typ.	Max.		
Bias Current	Ib	—	0.7	1.6	mA	Io1=0mA, Io2=0mA
[ 3.3V Output ]						
Output Voltage 1	Vo1	3.234	3.30	3.366	V	Io1=250mA
Dropout Voltage 1	ΔVd1	—	0.25	0.50	V	Io1=250mA, Vcc=3.135V
Peak Output Current 1	Io1	0.5	—	—	A	
Ripple Rejection 1	R.R.1	—	68	—	dB	f=120Hz, ein=1Vp-p, Io1=100mA
Line Regulation 1	Reg.I1	—	5	30	mV	Vcc=4.1V→16V, Io1=250mA
Load Regulation 1	Reg.L1	—	30	75	mV	Io1=0mA→0.5A
Temperature Coefficient Output Voltage 1 *3	Tcvo1	—	±0.01	—	%/°C	Io1=5mA, Tj=0~125°C
[ 1.8V Output ]						
Output Voltage 2	Vo2	1.764	1.800	1.836	V	Io2=250mA
Peak Output Voltage 2	Io2	0.5	—	—	A	
Ripple Rejection 2	R.R.2	—	72	—	dB	f=120Hz, ein=1Vp-p, Io2=100mA
Line Regulation 2	Reg.I2	—	5	30	mV	Vcc=4.1V→16V, Io2=250mA
Load Regulation 2	Reg.L2	—	30	75	mV	Io2=0mA→0.5A
Temperature Coefficient Output Voltage 2 *3	Tcvo1	—	±0.01	—	%/°C	Io2=5mA, Tj=0~125°C

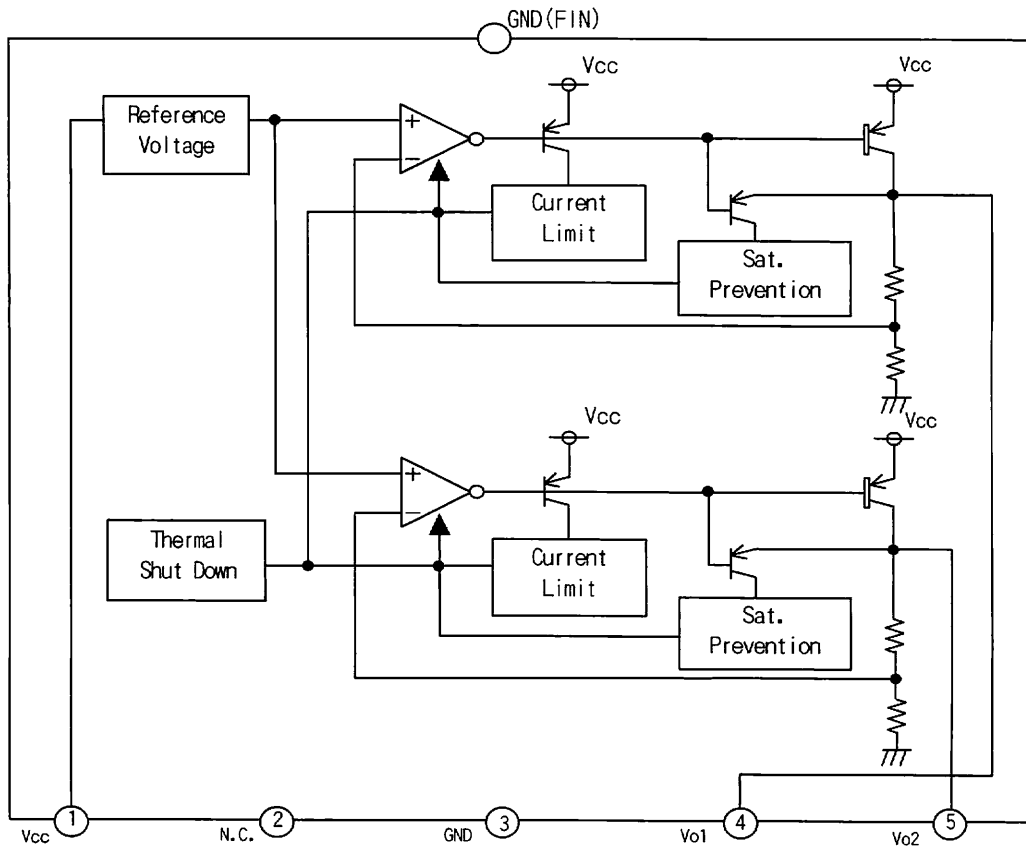
\*3 Design Guarantee (Outgoing inspection is not done on all products.)

○ PHYSICAL DIMENSIONS • MARKING



HRP5 (単位: mm)

○ Block Diagram



\* Refer to the Technical Note about the details of the application.

○ Pin No. • Pin Name

Pin No.	Pin Name
1	Vcc
2	N.C
3	GND
4	Vo1
5	Vo2
FIN	GND

## NOTES FOR USE

## 1. Absolute maximum range

This product are produced with strict quality control, but might be destroyed in using beyond absolute maximum ratings. The IC destroyed a failure mode cannot be defined (like Short mode, or Open mode). Therefore physical security countermeasure, like fuse, is to be given when a specified mode to be beyond absolute maximum ratings is considered.

## 2. Ground potential

GND terminal should be a lowest voltage potential every state.

Please make sure all pins which is over ground even if include transient feature.

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## 3. About oscillation stopper of output and bypass capacitor

Please put into capacitor to stop oscillation between output pin and GND. It has a possibility of oscillation if capacitance is changed due to temperature change, etc and it recommends using small tantalum electrolytic capacitor of internal serial resistor (ESR). It recommends degree of 10  $\mu$ F capacitance capacitor. If extremely big capacitor (over 1000  $\mu$ F) is used, it may have a case to occur oscillation of low frequency. Please confirm for the point. And it recommend to put into bypass capacitor with 1  $\mu$ F degree into the nearest position between Vcc pin and GND.

## 4. Over current protection circuit

The over-current protection circuits are built in at output, according to their respective current outputs and prevent the IC from being damaged when the load is short-circuited or over-current. But, these protection circuits are effective for preventing destruction by unexpected accident. When it's in continuous protection circuit moving period don't use please. And for ability, because this chip has minus characteristic, be careful for heat plan.

## 5. Built-in thermal circuit

A temperature control circuit is built in the IC to prevent the damage due to overheat.

Therefore, all the outputs are turned off when the thermal circuit works and are turned on when the temperature goes down to the specified level.

But, built-in the IC a temperature control circuit to protect itself. Except this IC, the other components be designed under 150°C.

## 6. Mounting Failures

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

## 7. Application

Internal circuit could be damaged if there are modes in which the electric potential of the application's input (Vcc) and GND are the opposite of the electric potential of the various outputs. Use of a diode or other such bypass is recommended.

## 8. Mal-function may happen when the device is used in the strong electromagnetic field.

## 9. Recommended 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.

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