STRUCTURE Silicon Monolithic Integrated Circuit

TYPE System Power Supply with Voltage Detector Function

PRODUCT SERIES **B A 4 9 0 7 F P**

FEATURES • Built in multiple microcontroller outputs, RESET with a microcontroller delay, BATTERY／ACCESSORY voltage detection.

OABSOLUTE MAXIMUM RATINGS (Ta=25℃)

Parameter	Symbol	Limits	Unit
Supply Voltage	Vcc	36	V
Power Dissipation1	Pd1	0.85	W
Power Dissipation2(*1)	Pd2	1.45	W
Power Dissipation3(*2)	Pd3	6.60	W
Operating Temperature Range	Topr	-40～+85	℃
Storage Temperature Range	Tstg	-55～+150	℃
Peak Supply Voltage	Vcc PEAK	50(注1)	V

Bias voltage is less than 200 msec. (tr≧1msec)
(*1) Mounted on 70mm × 70mm × 1.6mm Glass epoxy PCB(Ta=25℃).
(*2) With infinity Al heat sink(Ta=75℃).

ORECOMMENDED OPERATING RANGES (Ta=25℃)

Parameter	Min.	Typ.	Max.	Unit
Supply Voltage	7.85	14.4	18	V

*No guarantee electrical characteristics.

*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℃, Vcc=14.4V)

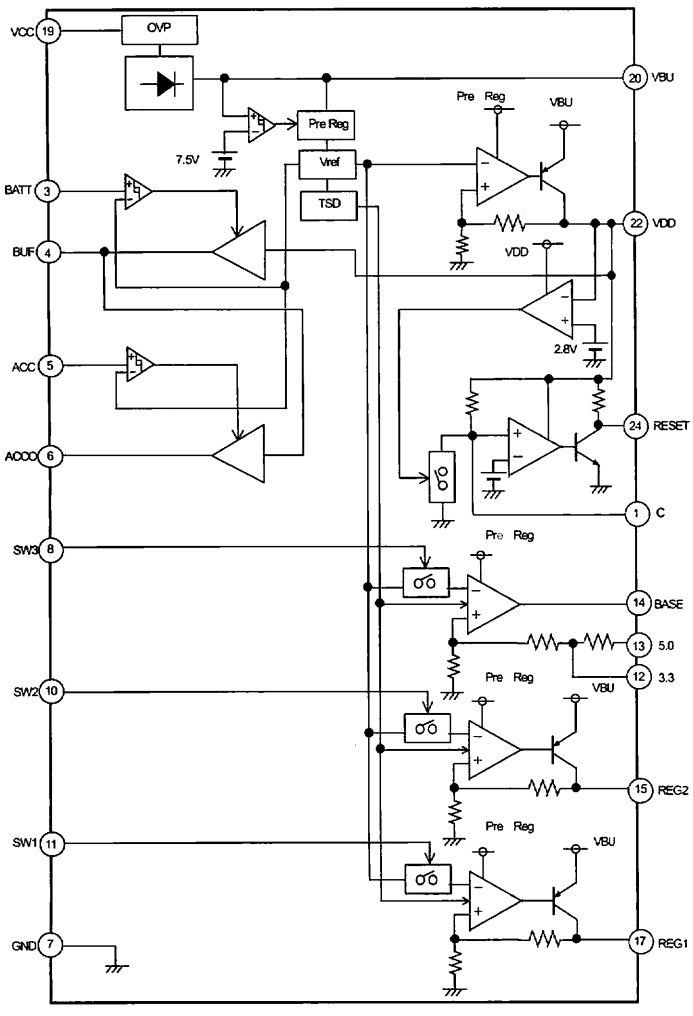
Parameter	Limits			Limits	Condition
	Min.	Typ.	Max.		
Standby Current	-	125	150	μA	Vcc=14.4V
[Output Block]					
Output Voltage (VDD)	4.75	5.0	5.25	V	Io=150mA
Line Regulation	-	5	50	mV	7.85V≦Vcc≦18V
Load Regulation	-	90	-	mV	5mA≦Io≦150mA
Dropout Voltage	-	1.9	2.6	V	Vcc≧5V
Peak Output Current	100	-	-	mA	
Ripple Rejection	-	60	-	dB	
Output Voltage(REG1)	4.75	5.0	5.25	V	Io=50mA
Line Regulation	-	10	-	mV	7.85V≦Vcc≦18V,Io=50mA
Load Regulation	-	90	-	mV	Io=0～50mA
Dropout Voltage	-	1.9	2.6	V	Io=50mA
Peak Output Current	100	-	-	mA	VREG1≧4.75V
Ripple Rejection	-	60	-	dB	f=100HZ,VRR=-10dBV
Output Voltage(REG2)	4.75	5.0	5.25	V	Io=10mA
Line Regulation	-	10	-	mV	7.85V≦Vcc≦18V,Io=10mA
Load Regulation	-	90	-	mV	Io=0～10mA
Dropout Voltage	-	1.9	2.6	V	Io=10mA
Peak Output Current	100	-	-	mA	VREG2≧4.75V
Ripple Rejection	-	60	-	dB	f=100HZ,VRR=-10dBV
[VBU Detector Block]					
Detection Voltage H	6.2	7.5	8.1	V	VBU Voltage
Detection Voltage L	-	2.25	-	V	VBU Voltage
Hysteresis Width	-	5.25	-	V	
[RESET Block]					
Detection Voltage	2.7	2.8	2.9	V	VDD Voltage
Sink Current	1	4	-	mA	RESET≦0.5V
RESET Pull Up Resistance	2.5	3.1	3.7	KΩ	VDD=5V
C Terminal Voltage	3.00	3.33	3.66	V	VDD=5V
Charge Resistance	160	200	240	KΩ	※VDD=5V
RESET Rise Time	-	-	50	μsec	
RESET Fall Time	-	-	50	μsec	
[BATT Voltage Detection]					
Threshold Voltage	1.18	1.23	1.28	V	L→H
Hysteresis Width	36	72	144	mV	
BUF Voltage H	4.0	-	5.25	V	Io=5μA
BUF Voltage L	-	-	0.5	V	I1=OmA
Output Current H	5	10	-	mA	VOH≧4V
Output Current L	0.1	0.2	-	mA	VOL≦0.5V
BUF Rise Time	-	-	50	μsec	
BUF Fall Time	-	-	50	μsec	
[Acc Voltage Detection]					
Hysteresis Width	36	72	144	mV	
Output Voltage H	4.0	-	5.25	V	Io=5μA
Output Voltage L	-	-	0.5	V	I1=OmA
Output Current H	5	10	-	mA	VOH≧4V
Output Current L	0.1	0.2	-	mA	VOL≦0.5V
Acc Rise Time	-	-	50	μsec	
Acc Fall Time	-	-	50	μsec	

※Delay Time t=200KΩ×1.15C(sec)

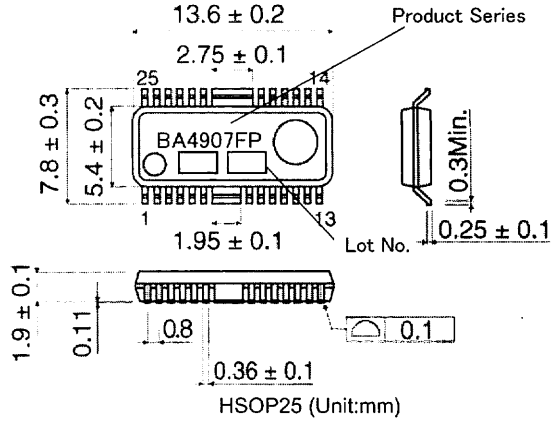
※Design Guarantee(Outgoing Inspection is not done on all products)

Parameter	Limits			Limits	Condition
	Min.	Typ.	Max.		
Backup-swich					
VBU Peak Output Current	0.2	0.3	-	A	VBU>5V
Reverse Current	-	-	200	μA	Up=0V. VBU=12V
REG1,2,3SW					
Standby Level	-	-	1.4	V	
Active Level	2.2	-	-	V	
SW Input Current	13	25	37	μA	REG1,2,3SW=5V
REG3					
Output Voltage	4.75	5	5.25	V	
Base Current	7	-	-	mA	Vo≧4.75V

O BLOCK DIAGRAM



OPHYSICAL DIMENSIONS・MARKING



HSOP25 (Unit:mm)

OPIN NO.・PIN NAME

PIN NO.	PIN NAME
1	C
2	N.C.
3	BATT
4	BUF
5	ACC
6	ACCO
FIN	FIN
7	GND
8	SW3
9	N.C.
10	SW2
11	SW1
12	3.3
13	5.0
14	BASE
15	REG2
16	N.C.
17	REG1
18	N.C.
19	VCC
20	VBU
21	N.C.
22	VDD
23	N.C.
24	RESET
25	N.C.

※Refer to the Technical Note about the details of the application.

ONOTES FOR USE

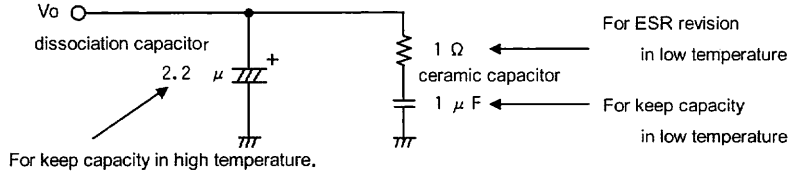
1. Over Voltage Protection Circuit
   The Over Voltage Protection Circuit function is that when the difference voltage of Vcc and Gnd exceeds over about 33V (room temperature), the each output turn off.
   Please be sure of the power supply voltage range you use.

2. Over Current Protection Circuit
   Each output , VDD , REG1 , REG2 and REG3 have the Over Current Protection Circuit that is enough for the each output current ability , and it protects the IC destruction against the huge current load.
   The protection circuit is 『fold back type』 current limiter and designed not as to occur the Latch Up by the huge current in a moment by the huge capacitor.
   In case of the output level is lower than 1Vbe , the output is considered as shorted mode , and the output current ability becomes smaller. So please make sure when you design the application.

3. Thermal Shut Down Circuit
   The Thermal Shut Down Circuit is built in IC to prevent the damage due to overheating. Therefore , all the output except VDD are turned off when it works , and turned on when the temperature goes down to the specified level.

4. Output Circuit
   VDD , REG1 and REG2 output constitutes PNP Power transistor. When the VCC terminal voltage drop lower , the IC has a counter measure not to be destroyed if the output voltage is lower than Vcc caused by the output capacitor.

5. The oscillation stopper of output capacitor
   Please use the oscillation stopper between the VDD , REG1 , REG2 , REG3 and VBU each output and Gnd. The capacitor is over 2.2μF and recommended the small temperature change one.
   In case of the capacitor temperature change is big , it may get characteristic improvement to use the serial 1μF ceramic capacitor and 1Ω resistor in pararell.
   ・Recommendation



6. The calcuration expression of the BATT and ACC detection.
   BATT and ACC detection voltage is controlled under the below expression.

   ○ L→H detection voltage

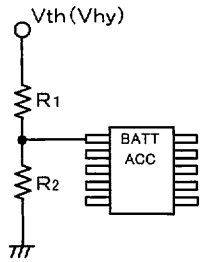
$$Vth = 1.23 \times \left(1 + \frac{R1}{R2}\right)$$

   reference voltage (accuracy±5%)
   * In consideration of temperature

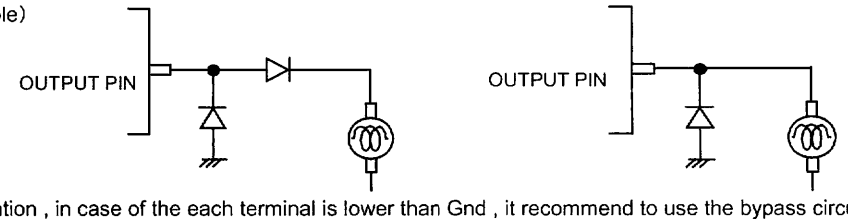
   ○ H→L hysteresis width

$$Vhy = 0.072 \times \left(1 + \frac{R1}{R2}\right)$$

   reference voltage (accuracy±50%)
   * In consideration of temperature



7. We recommend using Diode for protection purpose in case of output pin connected with large loads of impedance or reverse current at initial stages or output off stage.
   (Example)



8. In the application , in case of the each terminal is lower than Gnd , it recommend to use the bypass circuit.