

STRUCTURE                      Silicon Monolithic Integrated Circuit  
 TYPE                              System Power Supply with Voltage Detector Function  
 PRODUCT    SERIES        **BA4907FP**  
 FEATURES                      · Built in multiple microcontroller outputs, RESET with a microcontroller delay,  
                                       BATTERY/ACCESSORY voltage detection.

**ABSOLUTE MAXIMUM RATINGS (Ta=25°C)**

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	°C
Storage Temperature Range	Tstg	-55~+150	°C
Peak Supply Voltage	Vcc PEAK	50 (注1)	V

Bias voltage is less than 200 msec. ( $t_r \geq 1$  msec)

(\*1) Mounted on 70mm × 70mm × 1.6mm Glass epoxy PCB (Ta=25°C).

(\*2) With infinity Al heat sink (Ta=75°C).

**RECOMMENDED OPERATING RANGES (Ta=25°C)**

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.

OELECTRICAL CHARACTERISTICS(Unless otherwise specified, Ta=25°C, Vcc=14.4V)

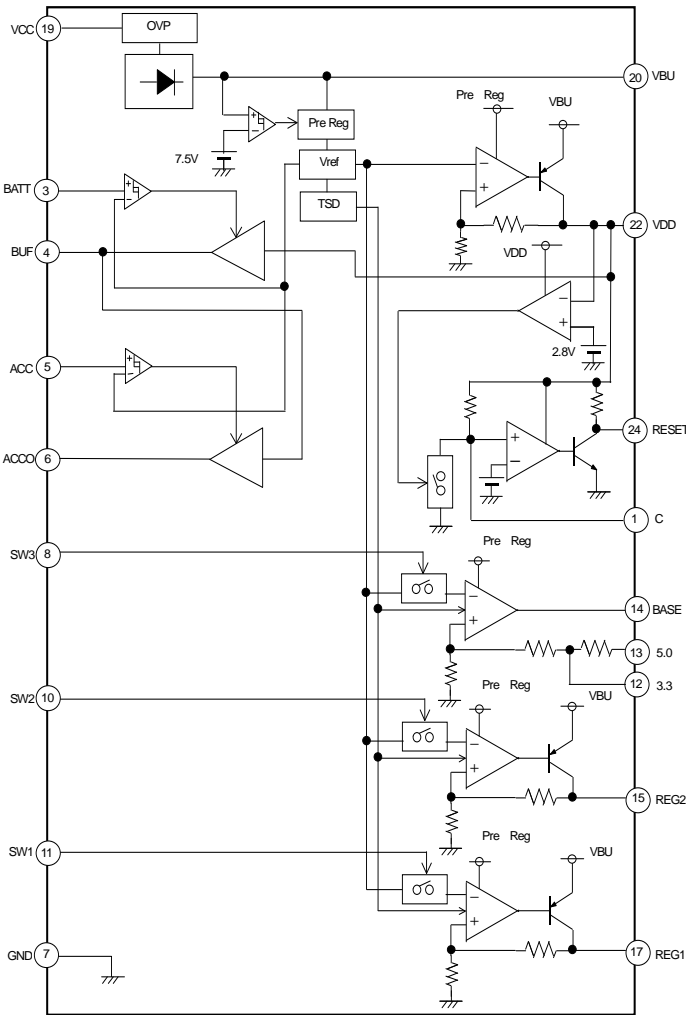
Parameter	Limits			Limits	Condition
	Min.	Typ.	Max.		
Standby Current	-	125	150	$\mu$ A	Vcc=14.4V
[Output Block]					
Output Voltage (VDD)	4.75	5.0	5.25	V	Io=150mA
Line Regulation	-	5	50	mV	$7.85V \leq V_{cc} \leq 18V$
Load Regulation	-	90	-	mV	$5mA \leq I_o \leq 150mA$
Dropout Voltage	-	1.9	2.6	V	$V_{cc} \geq 5V$
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	$7.85V \leq V_{cc} \leq 18V, I_o=50mA$
Load Regulation	-	90	-	mV	$I_o=0 \sim 50mA$
Dropout Voltage	-	1.9	2.6	V	$I_o=50mA$
Peak Output Current	100	-	-	mA	$V_{REG1} \geq 4.75V$
Ripple Rejection	-	60	-	dB	$f=100HZ, VRR=-10dBV$
Output Voltage (REG2)	4.75	5.0	5.25	V	Io=10mA
Line Regulation	-	10	-	mV	$7.85V \leq V_{cc} \leq 18V, I_o=10mA$
Load Regulation	-	90	-	mV	$I_o=0 \sim 10mA$
Dropout Voltage	-	1.9	2.6	V	$I_o=10mA$
Peak Output Current	100	-	-	mA	$V_{REG2} \geq 4.75V$
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	$RESET \leq 0.5V$
RESET Pull Up Resistance	2.5	3.1	3.7	K $\Omega$	VDD=5V
C Terminal Voltage	3.00	3.33	3.66	V	VDD=5V
Charge Resistance	160	200	240	K $\Omega$	$\times VDD=5V$
RESET Rise Time	-	-	50	$\mu$ sec	
RESET Fall Time	-	-	50	$\mu$ sec	
[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	$I_o=5 \mu$ A
BUF Voltage L	-	-	0.5	V	$I_1=0mA$
Output Current H	5	10	-	mA	$V_{OH} \geq 4V$
Output Current L	0.1	0.2	-	mA	$V_{OL} \leq 0.5V$
BUF Rise Time	-	-	50	$\mu$ sec	
BUF Fall Time	-	-	50	$\mu$ sec	
[Acc Voltage Detection]					
Hysteresis Width	36	72	144	mV	
Output Voltage H	4.0	-	5.25	V	$I_o=5 \mu$ A
Output Voltage L	-	-	0.5	V	$I_1=0mA$
Output Current H	5	10	-	mA	$V_{OH} \geq 4V$
Output Current L	0.1	0.2	-	mA	$V_{OL} \leq 0.5V$
Acc Rise Time	-	-	50	$\mu$ sec	
Acc Fall Time	-	-	50	$\mu$ sec	

 ※Delay Time t=200K $\Omega$  × 1.15C(sec)

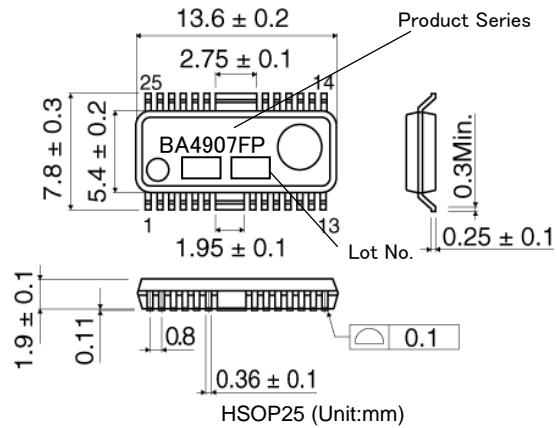
※Design Guarantee(Outgoing Inspection is not done on all products)

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

○ BLOCK DIAGRAM



○ PHYSICAL DIMENSIONS・MARKING



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

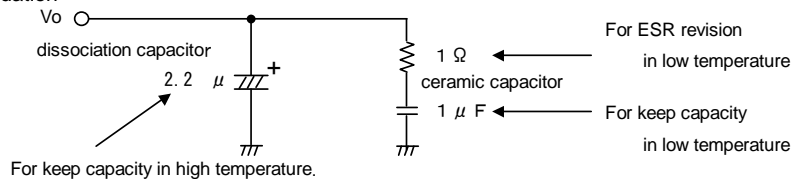
VDD , REG1 and REG2 output constitutes PNP Power transistor. When the Vcc terminal voltage drop lower , the IC has a counter measure not to be destroyed if the output voltage is lower than Vcc caused by the output capacitor.

### 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 2.2 μF 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 1 μF ceramic capacitor and 1 Ω resistor in parallel.

#### •Recommendation



### 6. The calculation expression of the BATT and ACC detection.

BATT and ACC detection voltage is controlled under the below expression.

#### ○ L→H detection voltage

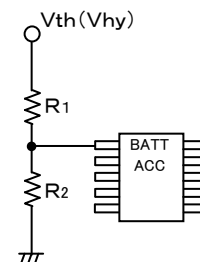
$$V_{th} = 1.23 \times \left(1 + \frac{R_1}{R_2}\right)$$

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

#### ○ H→L hysteresis width

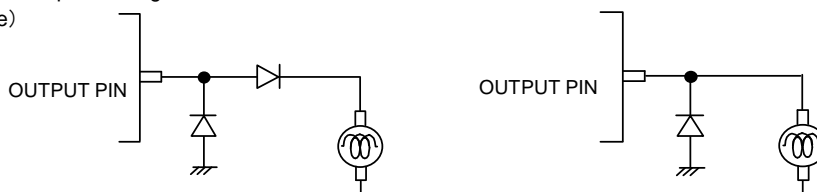
$$V_{hy} = 0.072 \times \left(1 + \frac{R_1}{R_2}\right)$$

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.

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