

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. (tr ≥ 1msec)

(*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.

*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.

OELECTRICAL CHARACTERISTICS(Unless otherwise specified, Ta=25°C, 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=5 μA |
| BUF Voltage L | - | - | 0.5 | V | I1=0mA |
| 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=5 μA |
| Output Voltage L | - | - | 0.5 | V | I1=0mA |
| 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)

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.

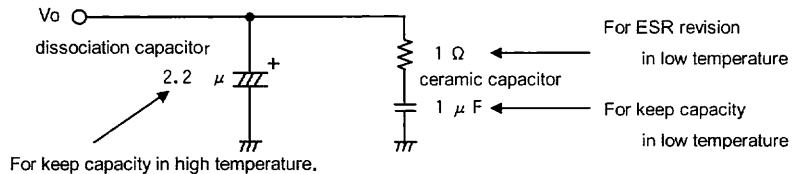
4. Output Circuit

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 pararell.

•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

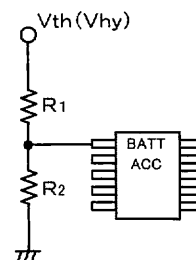
$$V_{th} = 1.23 \times \left(1 + \frac{R1}{R2}\right)$$

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

○ H→L hysteresis width

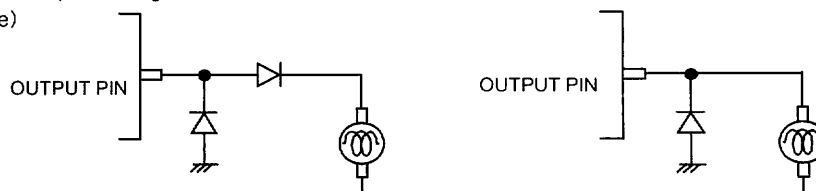
$$V_{hy} = 0.072 \times \left(1 + \frac{R1}{R2}\right)$$

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.