



## DESCRIPTION

The A4809C is a cost-effective system supervisor Integrated Circuit (IC) designed to monitor  $V_{CC}$  in digital and mixed signal systems and provide a warning signal when the system power supply is out of working range, and a reset signal to the host processor when necessary. No external components are required.

It features low supply current. CMOS output configurations is available. Since the delay circuit is built-in, peripherals are unnecessary and high density mounting is possible.

A4809C is available in SOT-23 package.

## ORDERING INFORMATION

| Package Type                 | Part Number                                  |                  |
|------------------------------|----------------------------------------------|------------------|
| SOT-23<br>SPQ: 3,000pcs/Reel | E3                                           | A4809CE3R-XXXDC  |
|                              |                                              | A4809CE3VR-XXXDC |
| Note                         | XXX: Detector Voltage<br>263=2.63V 293=2.93V |                  |
|                              | D: Delay Time<br>50ms~200ms                  |                  |
|                              | C: Type<br>C=CMOS                            |                  |
|                              | V: Halogen Free Package                      |                  |
|                              | R: Tape & Reel                               |                  |
|                              | AiT provides all RoHS products               |                  |

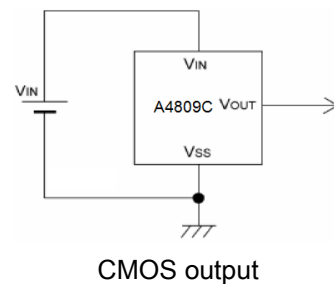
## FEATURES

- Precision  $V_{CC}$  Monitor for 2.63V, 2.93V
- Highly Accurate:  $\pm 1\%$
- Low Power Consumption : lower than  $1.5\mu A$
- Operating Voltage Range: 0.7V ~ 6.0V
- Detect Voltage Temperature Characteristics:  $\pm 100\text{ppm}/^{\circ}\text{C}$ (TYP.)
- Built-In Delay Circuit: 50ms ~ 200ms
- Output Configuration: CMOS
- Available in SOT-23 package

## APPLICATION

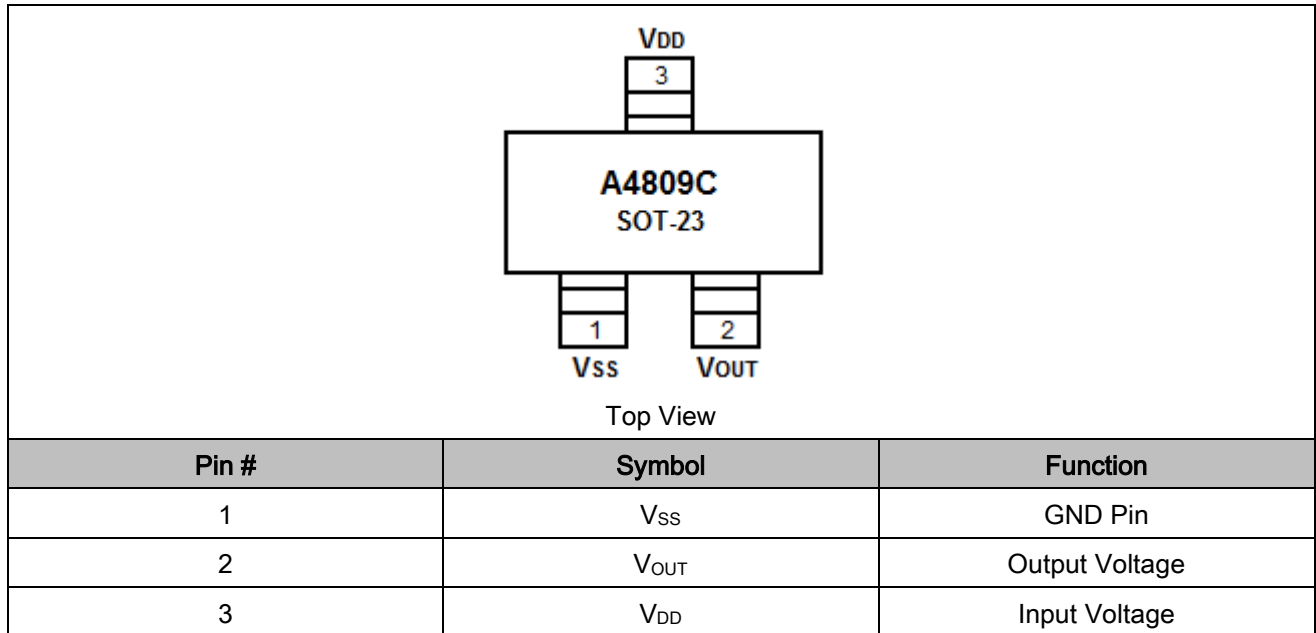
- Microprocessor reset circuitry
- Memory battery back-up circuits
- Power-on reset circuits
- Power failure detection
- System battery life and charge voltage monitors
- Delay circuitry

## TYPICAL APPLICATION





## PIN DESCRIPTION



## ABSOLUTE MAXIMUM RATINGS

|                                                |        |                                              |
|------------------------------------------------|--------|----------------------------------------------|
| V <sub>IN</sub> , Input Supply Voltage         |        | 6V                                           |
| I <sub>OUT</sub> , Output Current              |        | 30mA                                         |
| V <sub>OUT</sub> , Output Voltage              | CMOS   | V <sub>SS</sub> -0.3V~ V <sub>IN</sub> +0.3V |
| P <sub>D</sub> , Power Dissipation             | SOT-23 | 150mW                                        |
| T <sub>OPR</sub> , Operating Temperature Range |        | -30 °C ~+85°C                                |
| T <sub>STG</sub> , Storage Temperature Range   |        | -40°C ~+125°C                                |

Stresses beyond may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



## ELECTRICAL CHARACTERISTICS

| Parameter                                                         | Symbol                                               | Conditions                                 | Min                     | Typ                   | Max                     | Unit             |
|-------------------------------------------------------------------|------------------------------------------------------|--------------------------------------------|-------------------------|-----------------------|-------------------------|------------------|
| Detect Voltage                                                    | $V_{DF}$                                             |                                            | $V_{DF(T)} \times 0.98$ | $V_{DF(T)}$           | $V_{DF(T)} \times 1.02$ | V                |
| Hysteresis Range                                                  | $V_{HYS}$                                            |                                            | $V_{DF} \times 0.002$   | $V_{DF} \times 0.005$ | $V_{DF} \times 0.008$   | V                |
| Supply Current                                                    | $I_{SS}$                                             | $V_{IN}=1.5V$                              |                         | 1.0                   | 1.2                     | $\mu A$          |
|                                                                   |                                                      | $V_{IN}=2.0V$                              |                         | 1.0                   | 1.3                     |                  |
|                                                                   |                                                      | $V_{IN}=3.0V$                              |                         | 1.1                   | 1.3                     |                  |
|                                                                   |                                                      | $V_{IN}=4.0V$                              |                         | 1.1                   | 1.3                     |                  |
|                                                                   |                                                      | $V_{IN}=5.0V$                              |                         | 1.2                   | 1.5                     |                  |
| Operating Voltage                                                 | $V_{IN}$                                             | $V_{DF}=2.63V$ or $2.93V$                  | 0.7                     |                       | 6                       | V                |
| Output Current                                                    | $I_{OUT}$                                            | COMS, P-ch<br>$V_{DF}=2.63V$ $V_{IN}=6.0V$ |                         | -10                   |                         | mA               |
| Detect Voltage Temperature Characteristics                        | $\frac{\Delta V_{DF}}{\Delta T_{OPR} \times V_{DF}}$ |                                            |                         | $\pm 100$             |                         | ppm/ $^{\circ}C$ |
| Transient Delay time<br>( $V_{DR} \rightarrow V_{OUT}$ inversion) | $T_{DLY}^*$                                          | $V_{IN}$ changes from<br>0.7V to 6V        | 50                      |                       | 200                     | ms               |

NOTE1:  $V_{DF(T)}$ : Setting detect voltage value

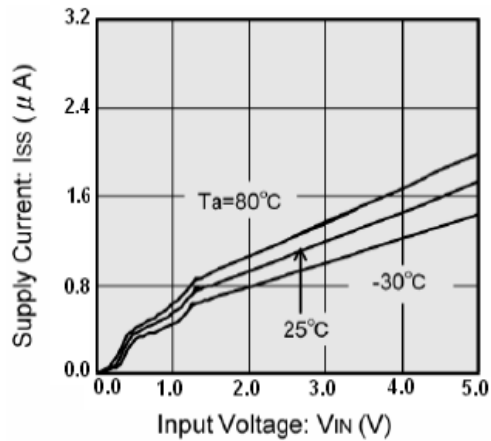
NOTE2: Release Voltage:  $V_{DR} = V_{DF} + V_{HYS}$

NOTE3: The power consumption during power-start to output being stable (release operation) is  $2\mu A$  greater than it is after that period (completion of release operation) because of delay circuit through current.

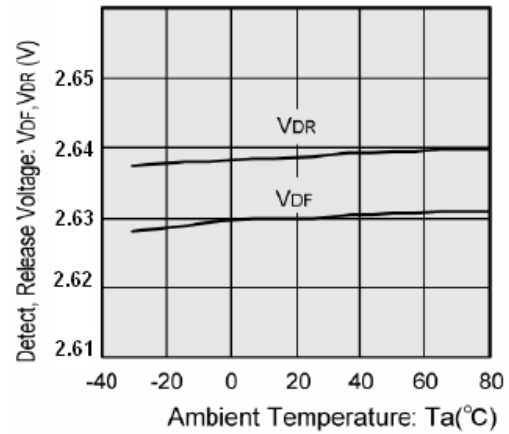


## TYPICAL PERFORMANCE CHARACTERISTIC

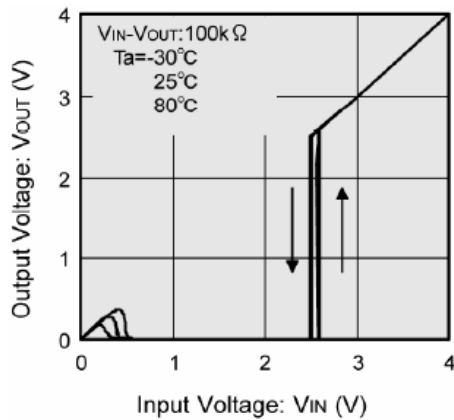
1. Supply Current vs. Input Voltage



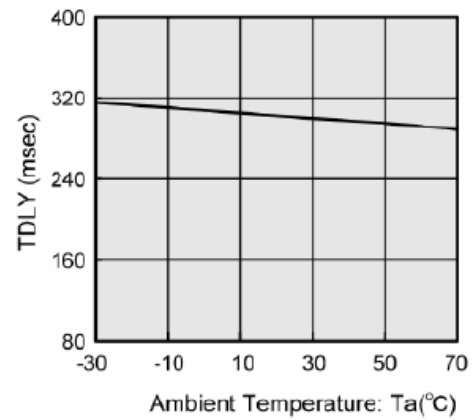
2. Detect Voltage, Release Voltage vs. Ambient Temperature



3. Output Voltage vs. Input Voltage

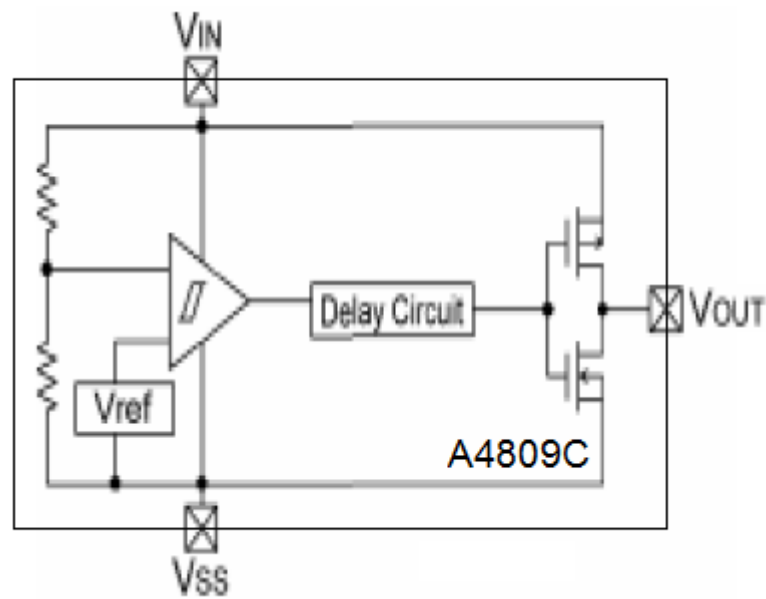


4. Ambient Temperature vs. Transient Delay Time





## BLOCK DIAGRAM



CMOS output



## DETAILED INFORMATION

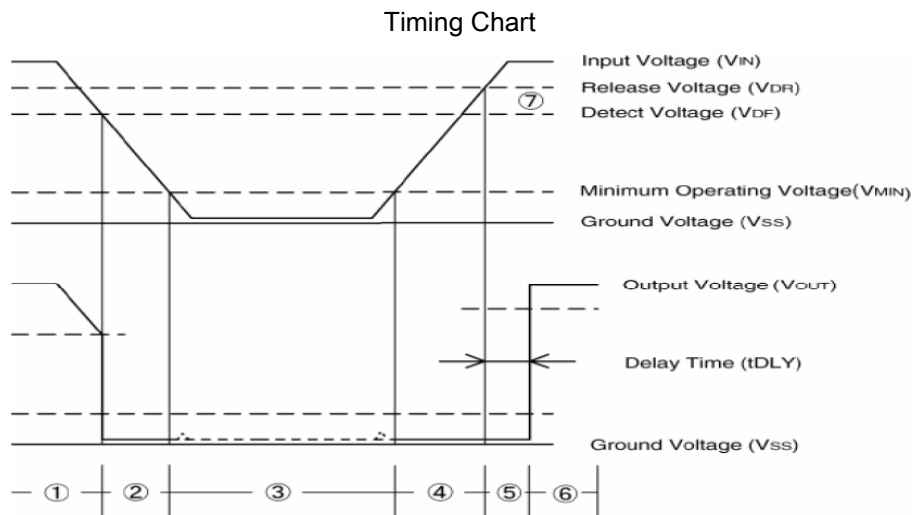
### Operational Explanation

#### CMOS output (the 4th is the most important)

1. When a voltage higher than the release voltage ( $V_{DR}$ ) is applied to the voltage input pin ( $V_{IN}$ ), the voltage will gradually fall. When a voltage higher than the detect voltage ( $V_{DF}$ ) is applied to  $V_{IN}$ , output ( $V_{OUT}$ ) will be equal to the input at  $V_{IN}$ .
2. When  $V_{IN}$  falls below  $V_{DF}$ ,  $V_{OUT}$  will be equal to the ground voltage ( $V_{SS}$ ) level (detect state).
3. When  $V_{IN}$  falls to a level below that of the minimum operating voltage ( $V_{MIN}$ ) output will become unstable.
4. When  $V_{IN}$  rises above the  $V_{SS}$  level (excepting levels lower than minimum operating voltage),  $V_{OUT}$  will be equal to  $V_{SS}$  until  $V_{IN}$  reaches the  $V_{DR}$  level. But if the rising rate is fast enough,  $V_{OUT}$  is equal to the pull up voltage.
5. Although  $V_{IN}$  will rise to a level higher than  $V_{DR}$ ,  $V_{OUT}$  maintains ground voltage level via the delay circuit.
6. Following transient delay time,  $V_{IN}$  will be output at  $V_{OUT}$ .

#### Notes:

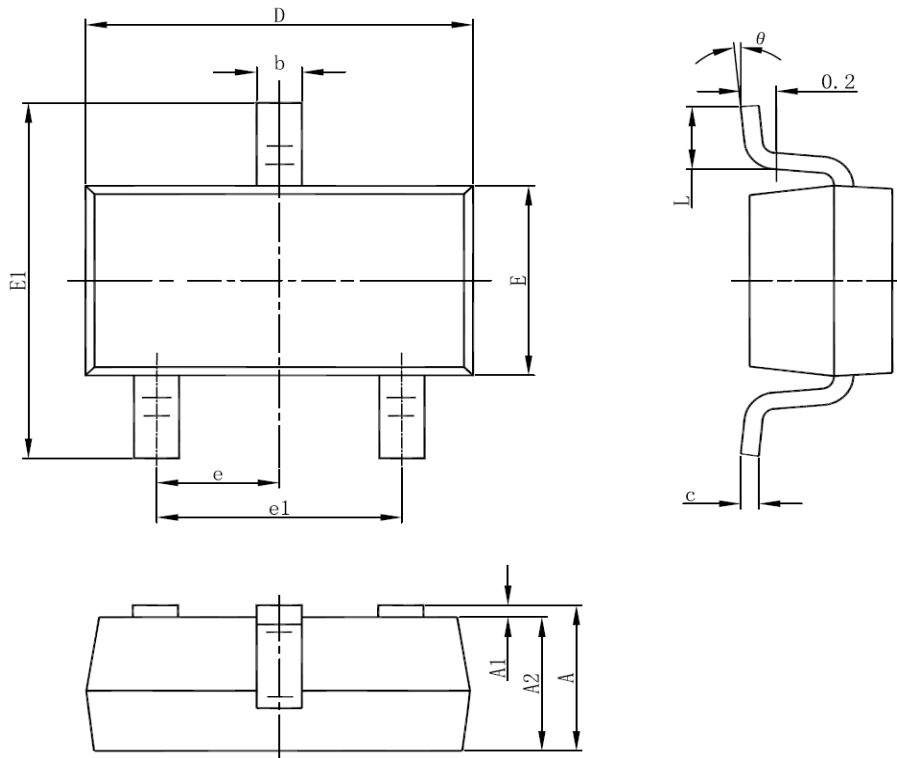
1. The difference between  $V_{DR}$  and  $V_{DF}$  represents the hysteresis range.
2. Propagation delay time ( $t_{DLY}$ ) represents the time it takes for  $V_{IN}$  to appear at  $V_{OUT}$  once the said voltage has exceeded the  $V_{DR}$  level.





## PACKAGE INFORMATION

Dimension in SOT-23 Package (Unit: mm)



| Symbol | Min        | Max   |
|--------|------------|-------|
| A      | 1.050      | 1.250 |
| A1     | 0.000      | 0.100 |
| A2     | 1.050      | 1.150 |
| b      | 0.300      | 0.500 |
| c      | 0.100      | 0.200 |
| D      | 2.820      | 3.020 |
| E      | 1.500      | 1.700 |
| E1     | 2.650      | 2.950 |
| e      | 0.950(BSC) |       |
| e1     | 1.800      | 2.000 |
| L      | 0.300      | 0.600 |
| θ      | 0°         | 8°    |



## IMPORTANT NOTICE

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