AP0809

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3-Pin Microprocessor Reset Circuits

Description

The AP0809 microprocessor supervisory circuit can be used to monitor the power supplies in microprocessor and digital systems. It provides a reset to the microprocessor during power-up, power-down, and brown-out conditions.

The function of the AP0809 is to monitor the V_{CC} supply voltage, and assert a reset signal whenever this voltage declines below the factory-programmed reset threshold. The reset signal remains asserted for 250ms after V_{CC} rises above the threshold. The AP0809 has an active-low $\overline{RESET}$ output.

With a low supply current of only 2μA (Typ.), the AP0809 are ideal for use in portable equipment. The AP0809 is available in the 3-pin SOT23 package.
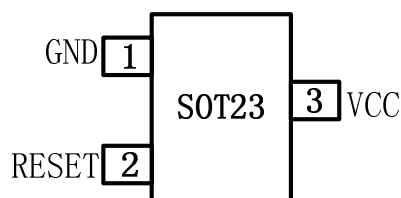
Applications

- Microprocessor Systems
- Computers
- Controllers
- Intelligent Instruments
- Portable/Battery-Powered Equipment
- Automotive

Features

- Precise monitoring of 2.7V, 3.0V, 3.3V and 5.0V supplies
- 140 ms min. Power-On Reset pulse width, 250ms typical, has an active-low $\overline{RESET}$ Output
- Guaranteed $\overline{RESET}$ Output valid for $V_{CC} \geq 1.1$ V
- Low Supply Current, 2μA Typ.
- Available in small SOT23 package
- No external components needed
- Specified over full temperature range -40°Cto+105°C
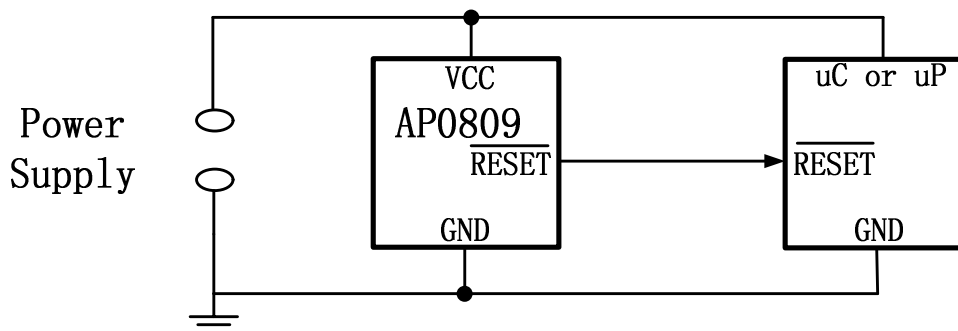
Package

Typical Application

Figure 2   Typical Application
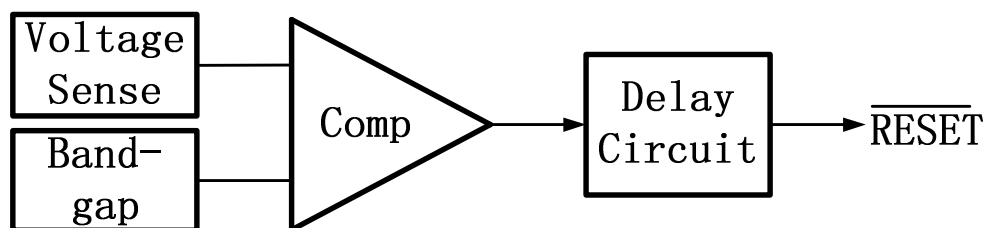
Function Diagram

Figure 3   Function Digram

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PIN Description

Pin No.	Pin Name	Description
1	GND	Ground reference
2	$\overline{\text{RESET}}$	Active-low output. $\overline{\text{RESET}}$ remains low while V_{CC} is below the reset threshold, and for 250ms after V_{CC} rises above the reset threshold.
3	V_{CC}	Supply Voltage

Absolute Maximum Ratings

V_{CC}……………………………………….. –0.3V to 6.0V
$\overline{\text{RESET}}$ ……………………………–0.3V to (VCC + 0.3V)
Input Current at V_{CC}………………..……………..20mA
Output Current: $\overline{\text{RESET}}$…………..…………... 20mA
Rate of Rise at V_{CC} ……………..………....100V/µs

Power Dissipation (T_A= 70°C) …………..……….. 320mW
(Derate 4mW/°C above 70°C)
Operating Temperature Range………….–40°C to 105°C
Storage Temperature Range……………–65°C to 160°C
Lead Temperature (soldering, 10 sec) …………... 300°C

These are stress ratings only and functional operation is not implied. Exposure to absolute maximum ratings for prolonged time periods may affect device reliability

Electrical Characteristics

Unless otherwise noted V_{CC} is over the full voltage range, T_A = –40°C to 105°C. Typical values at T_A = 25°C, V_{CC}= 5V for L/M/J devices, V_{CC} = 3.3V for T/S devices and V_{CC} = 3V for R devices.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input Voltage (V_{CC}) Range	Vcc	T_A= 0°C to 70°C	1.1		5.5	V
		T_A = –40°C to 105°C	1.2		5.5	
Supply Current	Icc	T_A = –40°C to 85°C VCC < 5.5V, L/M/J		2.5	5	uA
		T_A = –40°C to 85°C VCC < 3.6V, R/S/T		1.5	4	
		T_A = 85°C to 105°C VCC < 5.5V, L/M/J			10	
		T_A = 85°C to 105°C VCC < 3.6V, R/S/T			8	
Reset Threshold	V_{TH}	L devices T_A = 25°C	4.56	4.63	4.70	V
		T_A = –40°C to 85°C	4.50		4.75	
		T_A = 85°C to 105°C	4.4		4.86	
		M devices T_A = 25°C	4.31	4.38	4.45	
		T_A = –40°C to 85°C	4.25		4.50	
		T_A = 85°C to 105°C	4.16		4.56	
		J devices T_A = 25°C	3.93	4.00	4.06	
		T_A = –40°C to 85°C	3.89		4.10	
		T_A = 85°C to 105°C	3.80		4.20	
		T devices T_A = 25°C	3.04	3.08	3.11	
		T_A = –40°C to 85°C	3.00		3.15	
		T_A = 85°C to 105°C	2.92		3.23	
		S devices T_A = 25°C	2.89	2.93	2.96	
		T_A = –40°C to 85°C	2.85		3.00	
		T_A = 85°C to 105°C	2.78		3.08	
		R devices T_A = 25°C	2.59	2.63	2.66	
		T_A = –40°C to 85°C	2.55		2.70	
		T_A = 85°C to 105°C	2.50		2.76	
Reset Threshold Stability				30		ppm/°C
V_{CC} to Reset Delay		V_{CC} = V_{TH} to (V_{TH} - 100mV)		20		uS
Reset Active Timeout Period	T_{OL}	T_A = –40°C to 85°C	140	250	560	mS
		T_A = 85°C to 105°C	100		840	
$\overline{\text{RESET}}$ Output Voltage Low	V_{OL}	V_{CC}=V_{TH} min., I_{SINK} = 1.2mA, R/S/T			0.1	V
		V_{CC}=V_{TH} min., I_{SINK} = 3.2mA, L/M/J			0.2	
		V_{CC} > 1.1V, I_{SINK} = 50µA			0.1	
$\overline{\text{RESET}}$ Output Voltage High	V_{OH}	V_{CC}=V_{TH} max, Isource=500uA, R/S/T	0.9Vcc			V
		V_{CC}=V_{TH} max, Isource=800uA, L/M/J	Vcc-1.5			

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Detailed Descriptions

Reset Timing

The reset signal is asserted–low for the AP0809–when the V_{CC} signal falls below the threshold trip voltage and remains asserted for 140ms minimum after the VCC has risen above the threshold.
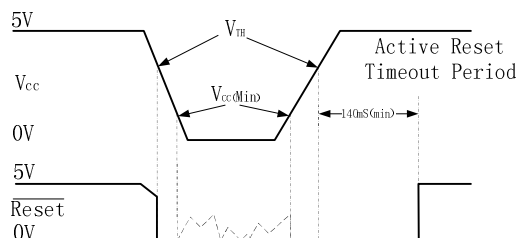

Figure 4   Reset Timing Diagram

Negative V_{CC} Transients

TheAP0809 protects µPs from brownouts and low V_{CC}. Short duration transients of 100mV amplitude and 20µs or less duration typically do not cause a false RESET.

Valid Reset with V_{CC} under 1.1V

To ensure logic inputs connected to the AP0809 RESET pin are in a known state when V_{CC} is under 1.1V, a 100kΩ pull-down resistor at RESET is needed. The value is not critical.
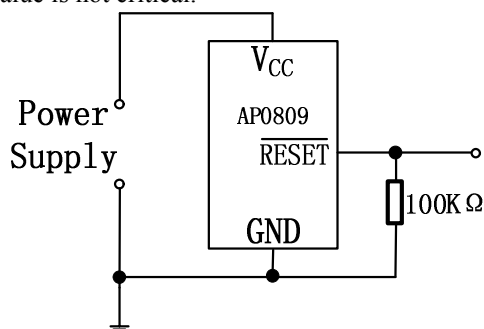

Figure 5   RESET Valid with V_{CC} Under 1.1V

Bi-directional Reset Pin Interfacing

The AP0809 can interface with µP/µC bi-directional reset pins by connecting a 4.7kΩ resistor in series with the AP0809 reset output and the µP/µC bi-directional reset pin.
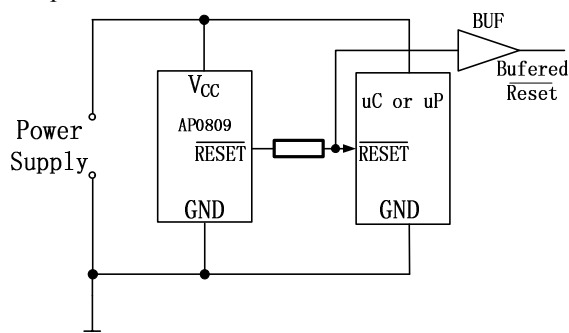

Figure 6   Bi-directional Reset Pin Interfacing

Order Information

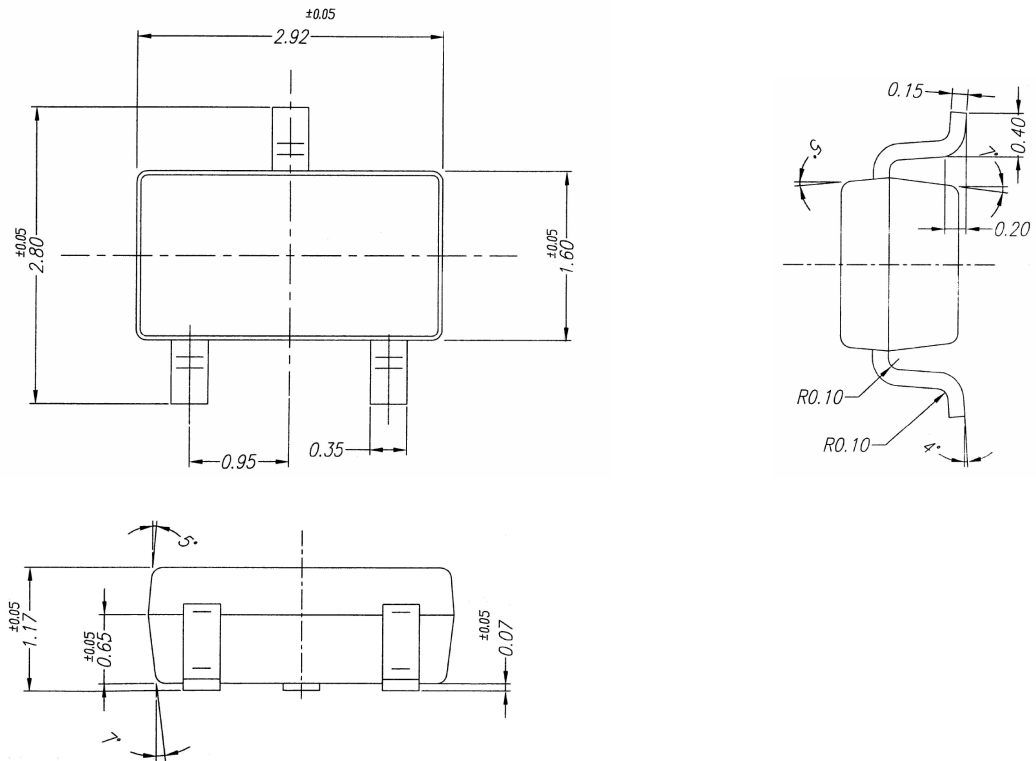| Part Number	Top Mark	Package	Description
AP0809ES3-R	09R	SOT23-3	2.63V
AP0809ES3-S	09S	SOT23-3	2.93V
AP0809ES3-T	09T	SOT23-3	3.08V
AP0809ES3-M	09M	SOT23-3	4.38V

Packaging Information

Figure 7   SOT23-3

Unit: mm

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