



## 3 Pin Microcontroller Power Supply Supervisor

### General Description

The ASM809/ASM810 are cost effective 3.0V, 3.3V and 5.0V power supply supervisor circuits optimized for low-power microprocessor ( $\mu\text{P}$ ), microcontroller ( $\mu\text{C}$ ) and digital systems. They provide a reset output during power-up, power-down and brown-out conditions. They provide excellent reliability by eliminating external components and adjustments. The ASM809/810 are improved drop-in replacements for the Maxim MAX809/810 and feature 60% lower supply current.

A reset signal is issued if the power supply voltage drops below a preset reset threshold and is asserted for at least 140ms after the supply has risen above the reset threshold. The ASM809 has an active-low  $\overline{\text{RESET}}$  output that is guaranteed to be in the correct logic state for  $V_{\text{CC}}$  down to 1.1V. The ASM810 has an active-high RESET output. The reset comparator is designed to ignore fast transients on  $V_{\text{CC}}$ .

Low supply current makes the ASM809/ASM810 ideal for use in portable and battery operated equipment. The ASM809/ASM810 are available in a compact, industry standard 3-pin SOT23 package.

### Applications

- Embedded controllers
- Portable/Battery operated systems
- Intelligent instruments
- Wireless communication systems
- PDAs and handheld equipment
- Computers

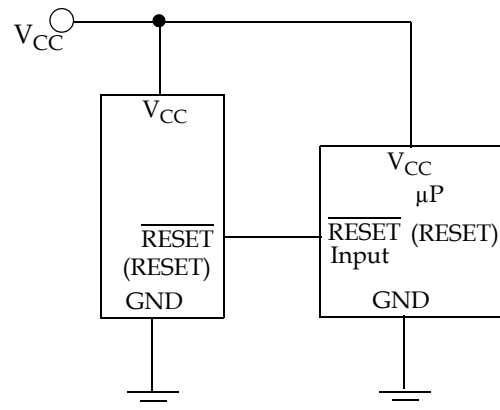
Six voltage thresholds are available to support 3V to 5V systems:

RESET THRESHOLD	
Suffix	Voltage
L	4.63
M	4.38
J	4.00
T	3.08
S	2.93
R	2.63

### Features:

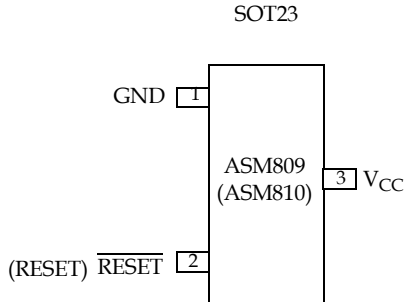
- Monitor 5V, 3.3V and 3V supplies
- 140ms min. reset pulse width
- Active-low reset valid with 1.1V supply (ASM809)
- Small 3-pin SOT-23 package
- No external components
- Specified over full temperature range -  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$

### Typical Operating Circuit

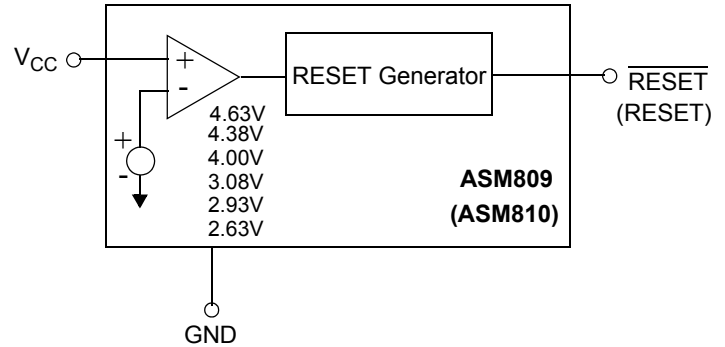




Pin Diagram



Block Diagram



Pin Description

Pin #		Pin Name	Function
ASM809	ASM810		
1	-	GND	Ground.
2	-	$\overline{\text{RESET}}$	$\overline{\text{RESET}}$ is asserted LOW if $V_{CC}$ falls below $V_{TH}$ and remains LOW for $T_{RST}$ after $V_{CC}$ exceeds the threshold.
-	2	RESET	RESET is asserted HIGH if $V_{CC}$ falls below $V_{TH}$ and remains HIGH for $T_{RST}$ after $V_{CC}$ exceeds the threshold.
3	-	$V_{CC}$	Power supply input voltage (3.0V, 3.3V, 5.0V).

Detailed Description

A proper reset input enables a microprocessor / microcontroller to start in a known state. ASM809/810 assert reset to prevent code execution errors during power-up, power-down and brown-out conditions.

Reset Timing

The reset signal is asserted- LOW for the ASM809 and HIGH for the ASM810- when the  $V_{CC}$  supply voltage falls below the threshold trip voltage and remains asserted for 140ms minimum after the  $V_{CC}$  has risen above the threshold.

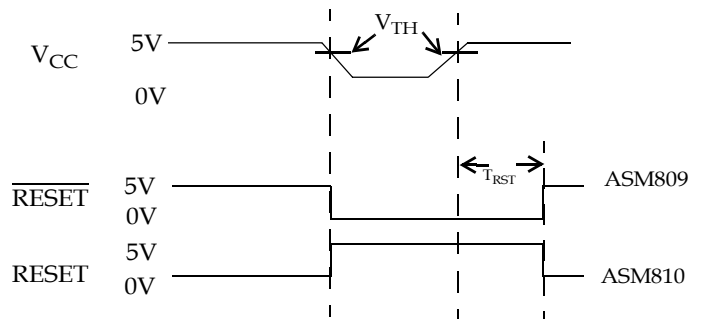


Figure 1: Reset Timing Diagram



**Application Information**

**Negative V<sub>CC</sub> Transients**

The ASM809/810 protect  $\mu$ Ps from brownouts and low V<sub>CC</sub>. Short duration transients of 100mV amplitude and 20 $\mu$ s or less duration typically do not cause a false RESET.

**Valid Reset with V<sub>CC</sub> under 1.1V**

When V<sub>CC</sub> is under 1.1V, to ensure logic inputs connected to the ASM809  $\overline{\text{RESET}}$  pin are in a known state, a 100k $\Omega$  pull-down resistor is needed at  $\overline{\text{RESET}}$ . The value of the resistor is not critical. A 100k $\Omega$  pull-up resistor to V<sub>CC</sub> at RESET is needed with the ASM810.

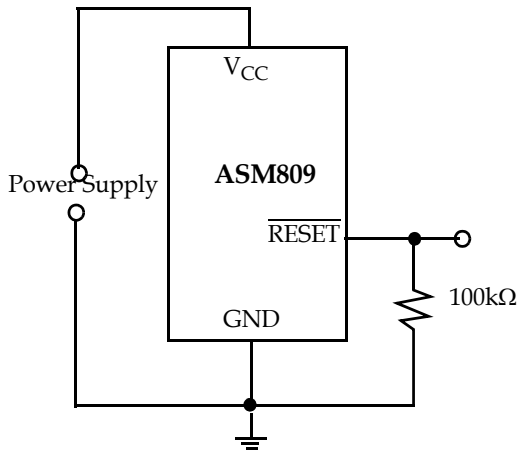


Figure 2:  $\overline{\text{RESET}}$  valid with V<sub>CC</sub> under 1.1V

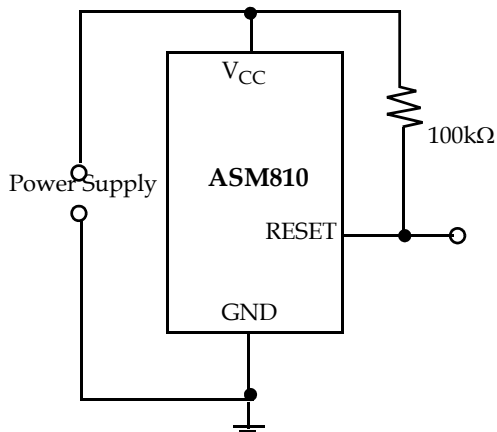


Figure 3: RESET valid with V<sub>CC</sub> under 1.1V

**Bidirectional Reset Pin Interfacing**

The ASM809/810 can interface with  $\mu$ P /  $\mu$ C bi-directional reset pins by connecting a 4.7k $\Omega$  resistor in series with the ASM809/810 reset output and the  $\mu$ P/ $\mu$ C bi-directional reset pin.

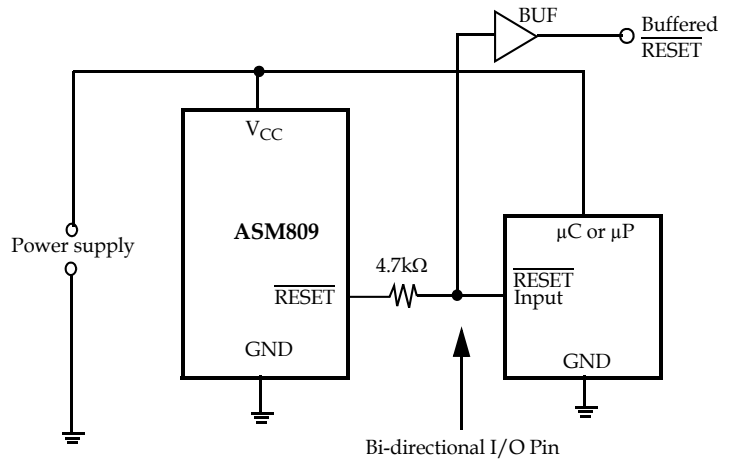


Figure 4: Bidirectional Reset Pin Interfacing



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**Absolute Maximum Ratings Table 1:**

Parameter	Min	Max	Units
Pin Terminal Voltage With Respect To Ground			
$V_{CC}$	-0.3	6.0	V
RESET, $\overline{\text{RESET}}$	-0.3	$V_{CC} + 0.3$	V
Input current at $V_{CC}$		20	mA
Output current: RESET, $\overline{\text{RESET}}$		20	mA
Rate of Rise at $V_{CC}$		100	V/ $\mu$ s
Note: These are stress ratings only and the functional operation is not implied. Exposure to absolute maximum ratings for prolonged time periods may affect device reliability.			

**Absolute Maximum Ratings Table 2:**

Parameter	Min	Max	Units
Power Dissipation ( $T_A = 70^\circ\text{C}$ )		320	$\mu$ W
Operating temperature range	-40	105	$^\circ\text{C}$
Storage temperature range	-65	160	$^\circ\text{C}$
Lead temperature (Soldering, 10 sec)		300	$^\circ\text{C}$
Note: These are stress ratings only and the functional operation is not implied. Exposure to absolute maximum ratings for prolonged time periods may affect device reliability.			



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**Electrical Characteristics:**

Unless otherwise noted,  $V_{CC}$  is over the full voltage range,  $T_A = -40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$ .

Typical values at  $T_A = 25^{\circ}\text{C}$ ,  $V_{CC} = 5\text{V}$  for L/M/J devices,  $V_{CC} = 3.3\text{V}$  for T/S devices and  $V_{CC} = 3\text{V}$  for R devices.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{CC}$	Input Voltage Range	$T_A = 0^{\circ}\text{C}$ to $70^{\circ}\text{C}$		1.1		5.5	V
		$T_A = -40^{\circ}\text{C}$ to $105^{\circ}\text{C}$		1.2		5.5	V
$I_{CC}$	Supply Current	$T_A = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$	$V_{CC} < 5.5\text{V}$ , L/M/J		9	15	$\mu\text{A}$
		$T_A = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$	$V_{CC} < 3.6\text{V}$ , R/S/T		6.8	10	
		$T_A = 85^{\circ}\text{C}$ to $105^{\circ}\text{C}$	$V_{CC} < 5.5\text{V}$ , L/M/J			25	
		$T_A = 85^{\circ}\text{C}$ to $105^{\circ}\text{C}$	$V_{CC} < 3.6\text{V}$ , R/S/T			20	
$V_{TH}$	Reset Threshold	L devices	$T_A = 25^{\circ}\text{C}$	4.56	4.63	4.70	V
			$T_A = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$	4.50		4.75	
			$T_A = 85^{\circ}\text{C}$ to $105^{\circ}\text{C}$	4.40		4.86	
		M devices	$T_A = 25^{\circ}\text{C}$	4.31	4.38	4.45	
			$T_A = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$	4.25		4.50	
			$T_A = 85^{\circ}\text{C}$ to $105^{\circ}\text{C}$	4.16		4.56	
J devices	$T_A = 25^{\circ}\text{C}$	3.93	4.00	4.06			
	$T_A = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$	3.89		4.10			
	$T_A = 85^{\circ}\text{C}$ to $105^{\circ}\text{C}$	3.80		4.20			
T devices	$T_A = 25^{\circ}\text{C}$	3.04	3.08	3.11			
	$T_A = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$	3.00		3.15			
	$T_A = 85^{\circ}\text{C}$ to $105^{\circ}\text{C}$	2.92		3.23			
S devices	$T_A = 25^{\circ}\text{C}$	2.89	2.93	2.96			
	$T_A = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$	2.85		3.00			
	$T_A = 85^{\circ}\text{C}$ to $105^{\circ}\text{C}$	2.78		3.08			
R devices	$T_A = 25^{\circ}\text{C}$	2.59	2.63	2.66			
	$T_A = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$	2.55		2.70			
	$T_A = 85^{\circ}\text{C}$ to $105^{\circ}\text{C}$	2.50		2.76			
	Reset Threshold Temp Coefficient				30		ppm/ $^{\circ}\text{C}$
	$V_{CC}$ to Reset Delay	$V_{CC} = V_{TH}$ to $V_{TH}-100\text{mV}$			60		$\mu\text{s}$

## Notes:

1. Production testing done at  $T_A = 25^{\circ}\text{C}$ . Over-temperature specifications guaranteed by design only, using six sigma design limits.
2. RESET output is active LOW for the ASM809 and RESET output is active HIGH for the ASM810.



Symbol	Parameter	Conditions	Min	Typ	Max	Unit
	Reset Active Timeout Period	$T_A = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$	140		560	ms
		$T_A = 85^{\circ}\text{C}$ to $105^{\circ}\text{C}$	100	240	840	
$V_{OL}$	Low $\overline{\text{RESET}}$ Output Voltage (ASM809)	$V_{CC} = V_{TH}$ min., $I_{SINK} = 1.2\text{mA}$ , ASM809R/S/T			0.3	V
		$V_{CC} = V_{TH}$ min., $I_{SINK} = 3.2\text{mA}$ , ASM809L/M/J			0.4	
		$V_{CC} > 1.1\text{V}$ , $I_{SINK} = 50\mu\text{A}$			0.3	
$V_{OH}$	High $\overline{\text{RESET}}$ Output Voltage (ASM809)	$V_{CC} > V_{TH}$ max., $I_{SOURCE} = 500\mu\text{A}$ , ASM809R/S/T	$0.8V_{CC}$			V
		$V_{CC} > V_{TH}$ max., $I_{SOURCE} = 800\mu\text{A}$ , ASM809L/M/J	$V_{CC} - 1.5$			
$V_{OL}$	Low $\overline{\text{RESET}}$ Output Voltage (ASM810)	$V_{CC} = V_{TH}$ max., $I_{SINK} = 1.2\text{mA}$ , ASM810R/S/T			0.3	V
		$V_{CC} = V_{TH}$ max., $I_{SINK} = 3.2\text{mA}$ , ASM810L/M/J			0.4	V
$V_{OH}$	High $\overline{\text{RESET}}$ Output Voltage (ASM810)	$1.8\text{V} < V_{CC} < V_{TH}$ min., $I_{SOURCE} = 150\mu\text{A}$	$0.8V_{CC}$			V
$T_{RST}$	Active Reset Timeout Period	$V_{CC} > V_{TH}$	140	240		msec

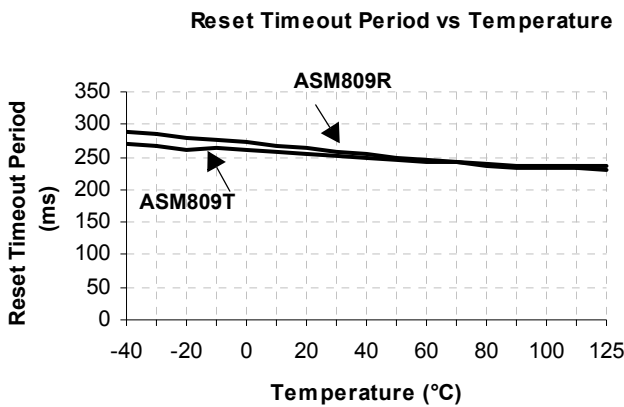
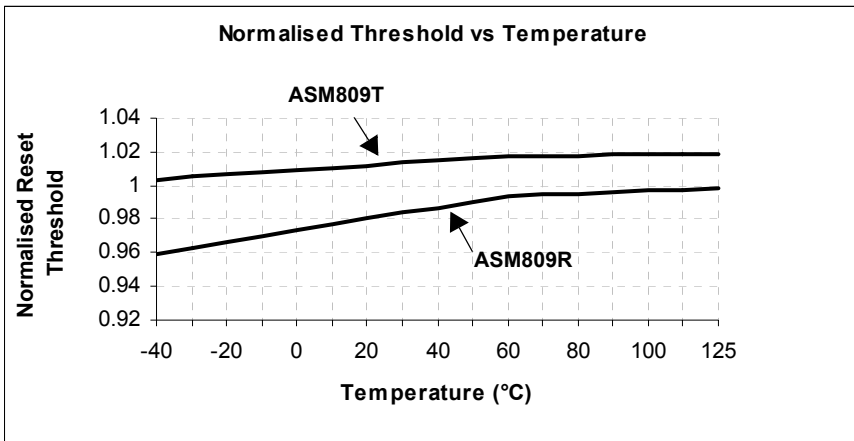
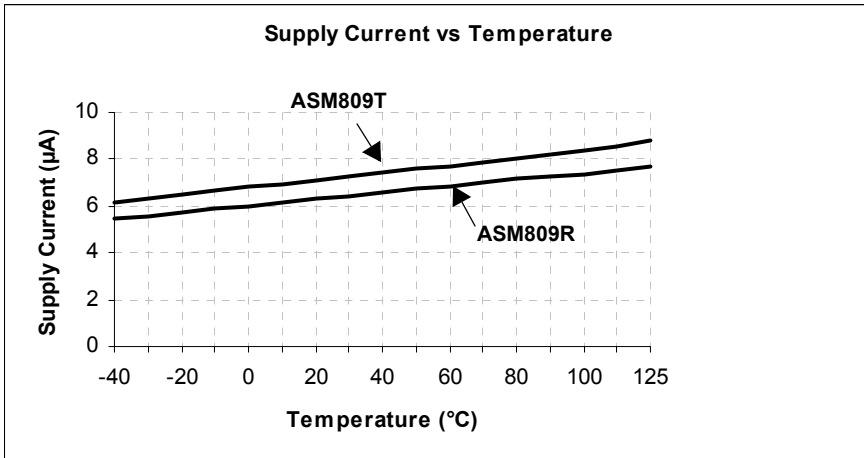
## Notes:

1. Production testing done at  $T_A = 25^{\circ}\text{C}$ . Over-temperature specifications guaranteed by design only, using six sigma design limits.
2.  $\overline{\text{RESET}}$  output is active LOW for the ASM809 and RESET output is active HIGH for the ASM810.



**Typical Operating Characteristics**

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

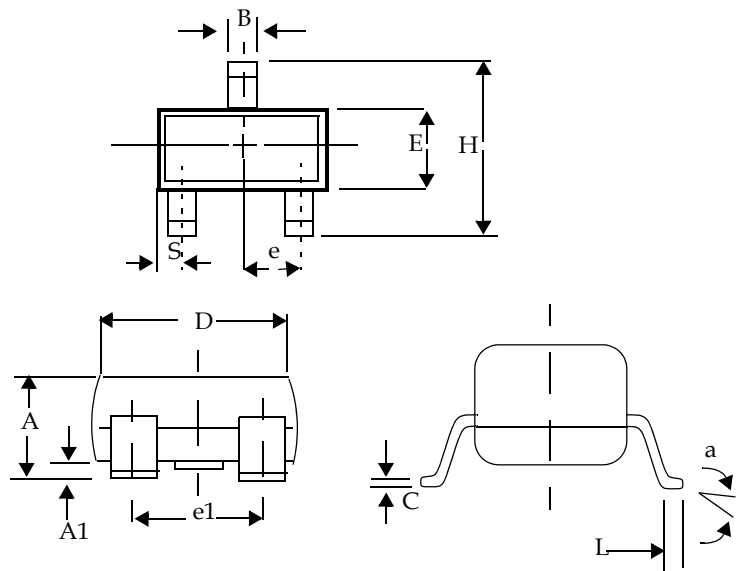




rev 1.0

Package Dimensions

	Inches		Millimeters	
	Min	Max	Min	Max
<b>Plastic SOT-23 (3-Pin)</b>				
A	0.031	0.050	0.80	1.27
A1	0.004	0.010	0.10	0.25
B	0.015	0.020	0.37	0.51
C	0.003	0.007	0.085	0.18
D	0.110	0.120	2.80	3.04
E	0.047	0.055	1.20	1.40
e	0.035	0.040	0.89	1.03
e1	0.070	0.080	1.78	2.05
H	0.083	0.103 9	2.10	2.64
L	0.027 REF		0.069 REF	
S	0.018	0.024	0.45	0.60







## Ordering Information:

Part Number <sup>1</sup>	Reset Threshold (V)	Temperature Range	Pin-Package	Package Marking (XX Lot Code)
<b>ASM809 ACTIVE LOW RESET</b>				
ASM809LEUR-T	4.63	-40°C to +105°C	3-SOT23	SAXX
ASM809MEUR-T	4.38	-40°C to +105°C	3-SOT23	SBXX
ASM809JEUR-T	4.00	-40°C to +105°C	3-SOT23	SCXX
ASM809TEUR-T	3.08	-40°C to +105°C	3-SOT23	SDXX
ASM809SEUR-T	2.93	-40°C to +105°C	3-SOT23	SEXX
ASM809REUR-T	2.63	-40°C to +105°C	3-SOT23	SFXX
<b>ASM810 ACTIVE HIGH RESET</b>				
ASM810LEUR-T	4.63	-40°C to +105°C	3-SOT23	SGXX
ASM810MEUR-T	4.38	-40°C to +105°C	3-SOT23	SHXX
ASM810JEUR-T	4.00	-40°C to +105°C	3-SOT23	SIXX
ASM810TEUR-T	3.08	-40°C to +105°C	3-SOT23	SJXX
ASM810SEUR-T	2.93	-40°C to +105°C	3-SOT23	SKXX
ASM810REUR-T	2.63	-40°C to +105°C	3-SOT23	SLXX
Notes:				
1. Tape and Reel packaging is indicated by the -T designation.				

## Related Products:

	ASM809	ASM810	ASM811	ASM812
Max Supply Current	15µA	15µA	15µA	15µA
Package Pins	3	3	4	4
Manual RESET input			■	■
Package Type	SOT-23	SOT-23	SOT-143	SOT-143
Active-HIGH RESET Output		■		■
Active-LOW RESET Output	■		■	



## ASM809, ASM810



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