



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 (μ P), microcontroller (μ 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_{CC} down to 1.1V. The ASM810 has an active-high RESET output. The reset comparator is designed to ignore fast transients on V_{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

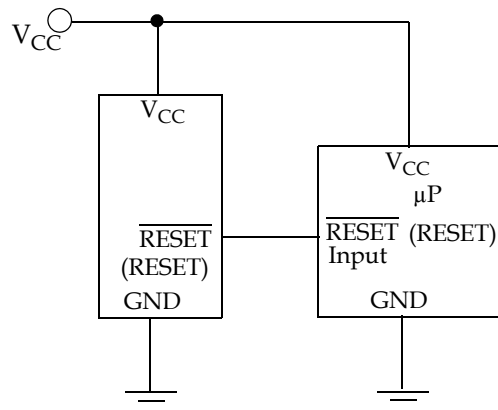
Six voltage thresholds are available to support 3V to 5V systems:

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

Features:

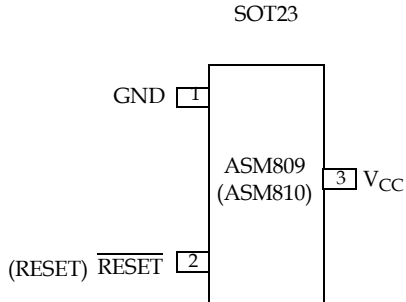
- Monitor 5V, 3.3V and 3V supplies
- 140ms min. reset pulse width
- Active-low reset valid with 1.1V supply (ASM809)
- Small 3-pin SOT-23 package
- No external components
- Specified over full temperature range - -40°C to 105°C

Typical Operating Circuit

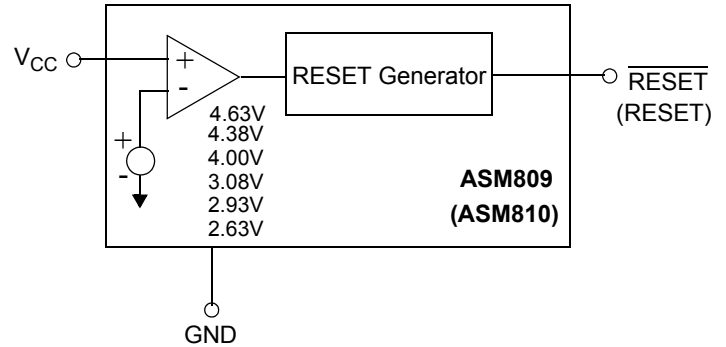




Pin Diagram



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.

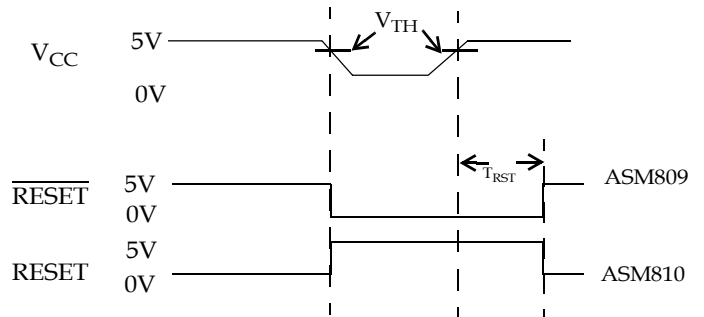


Figure 1: Reset Timing Diagram



Application Information

Negative V_{CC} Transients

The ASM809/810 protect μ Ps from brownouts and low V_{CC} . Short duration transients of 100mV amplitude and 20 μ s or less duration typically do not cause a false RESET.

Valid Reset with V_{CC} under 1.1V

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

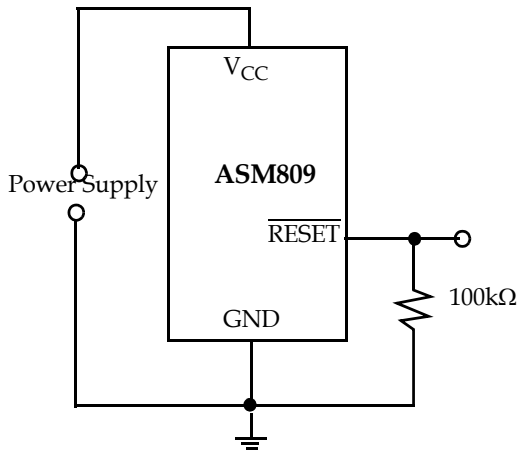


Figure 2: $\overline{\text{RESET}}$ valid with V_{CC} under 1.1V

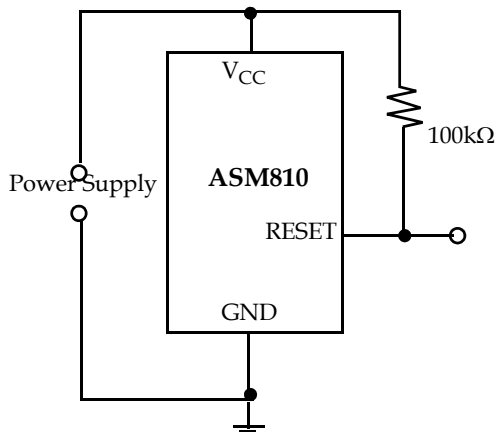


Figure 3: RESET valid with V_{CC} under 1.1V

Bidirectional Reset Pin Interfacing

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

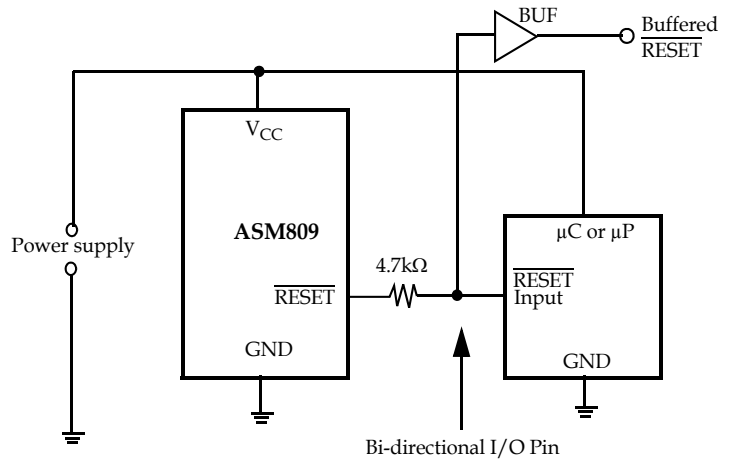


Figure 4: Bidirectional Reset Pin Interfacing

**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/ μ 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	μ 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.			



rev 1.0

Electrical Characteristics:Unless otherwise noted, V_{CC} is over the full voltage range, $T_A = -40^{\circ}\text{C}$ to 105°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°C		1.1		5.5	V
		$T_A = -40^{\circ}\text{C}$ to 105°C		1.2		5.5	V
I_{CC}	Supply Current	$T_A = -40^{\circ}\text{C}$ to 85°C	$V_{CC} < 5.5\text{V}$, L/M/J		9	15	μA
		$T_A = -40^{\circ}\text{C}$ to 85°C	$V_{CC} < 3.6\text{V}$, R/S/T		6.8	10	
		$T_A = 85^{\circ}\text{C}$ to 105°C	$V_{CC} < 5.5\text{V}$, L/M/J			25	
		$T_A = 85^{\circ}\text{C}$ to 105°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°C	4.50		4.75	
			$T_A = 85^{\circ}\text{C}$ to 105°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°C	4.25		4.50	
			$T_A = 85^{\circ}\text{C}$ to 105°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°C	3.89		4.10			
	$T_A = 85^{\circ}\text{C}$ to 105°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°C	3.00		3.15			
	$T_A = 85^{\circ}\text{C}$ to 105°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°C	2.85		3.00			
	$T_A = 85^{\circ}\text{C}$ to 105°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°C	2.55		2.70			
	$T_A = 85^{\circ}\text{C}$ to 105°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		μs

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.



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

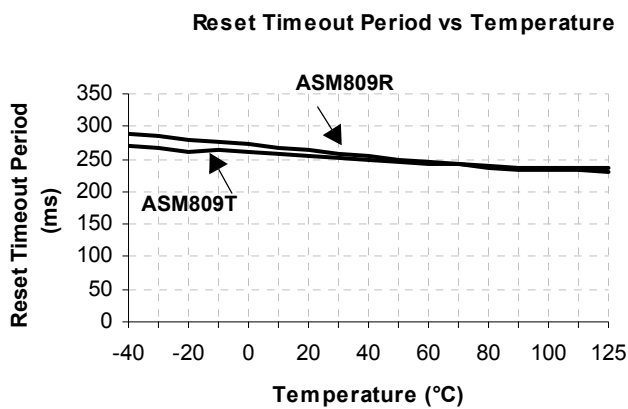
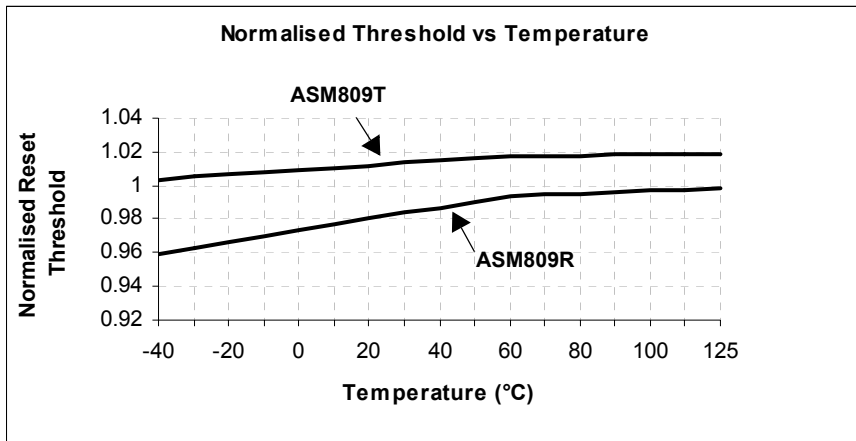
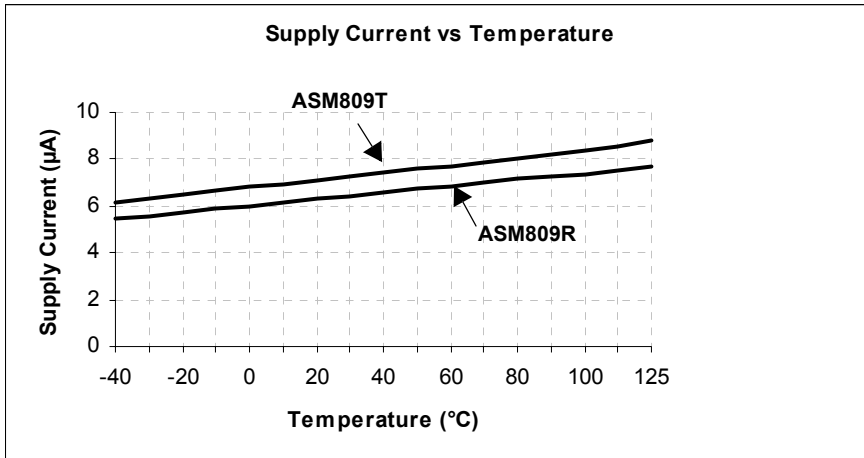
Notes:

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°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.

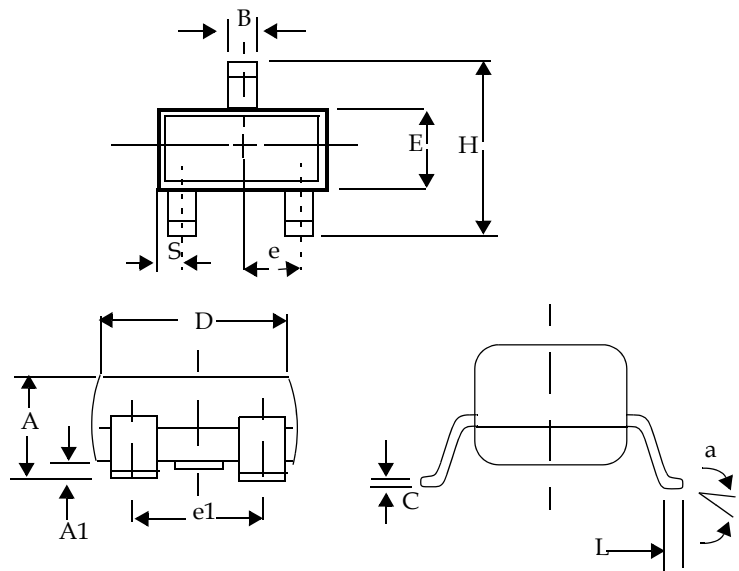




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Package Dimensions

	Inches		Millimeters	
	Min	Max	Min	Max
Plastic SOT-23 (3-Pin)				
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





rev 1.0

Ordering Information:

Part Number ¹	Reset Threshold (V)	Temperature Range	Pin-Package	Package Marking (XX Lot Code)
ASM809 ACTIVE LOW RESET				
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
ASM810 ACTIVE HIGH RESET				
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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Part Number: ASM809, ASM810
Document Version: v 1.0

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