ASM809, ASM810

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 (µP), microcontroller (µC) 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.

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

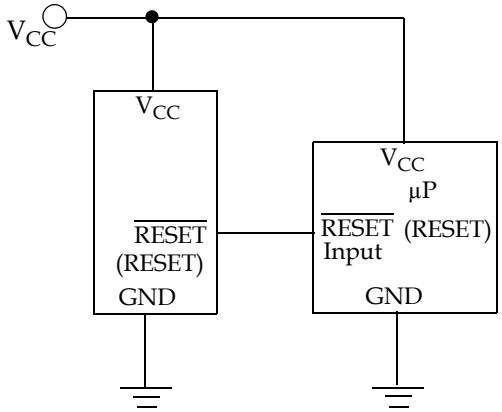
Features:

- 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

Applications

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

Typical Operating Circuit



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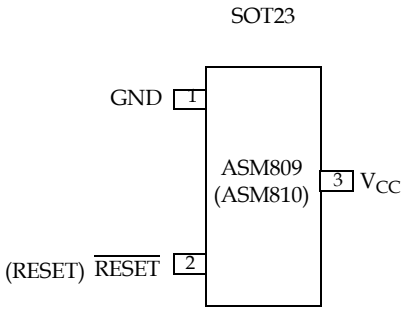
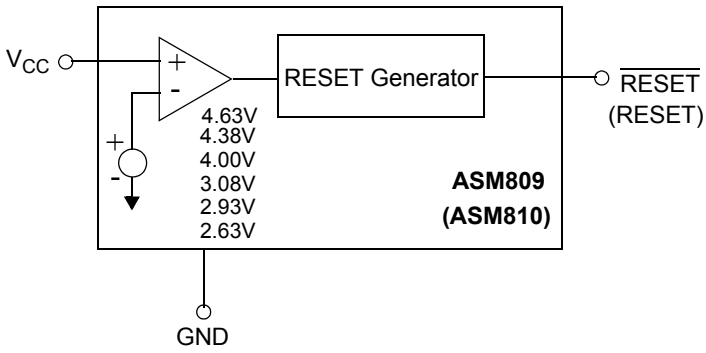
Pin Diagram



Block Diagram



Pin Description

Pin #		Pin Name	Function
ASM809	ASM810		
1	-	GND	Ground.
2	-	$\overline{RESET}$	$\overline{RESET}$ 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.

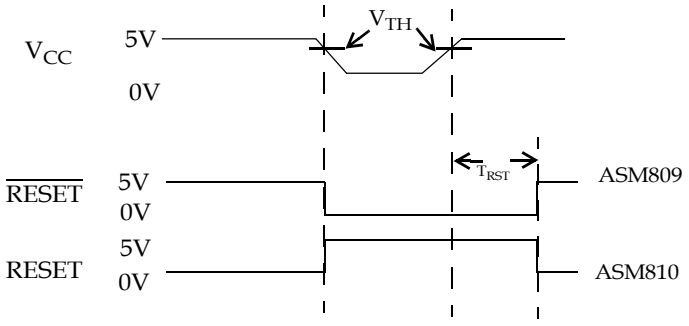


Figure 1: Reset TIming Diagram

Application Information

Negative V_{CC} Transients

The ASM809/810 protect 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

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 100kΩ pull-down resistor is needed at $\overline{\text{RESET}}$. The value of the resistor is not critical. A 100kΩ pull-up resistor to V_{CC} at RESET is needed with the ASM810.

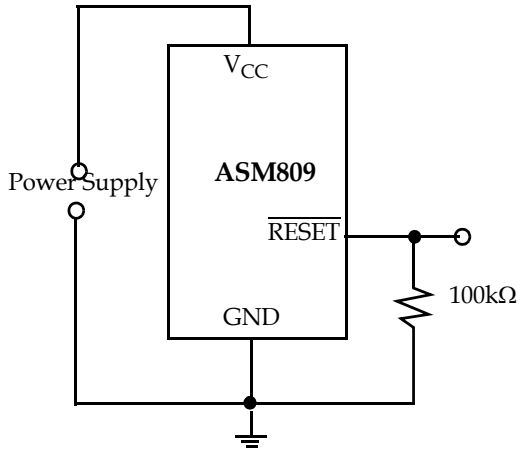


Figure 2: $\overline{\text{RESET}}$ valid with V_{CC} under 1.1V

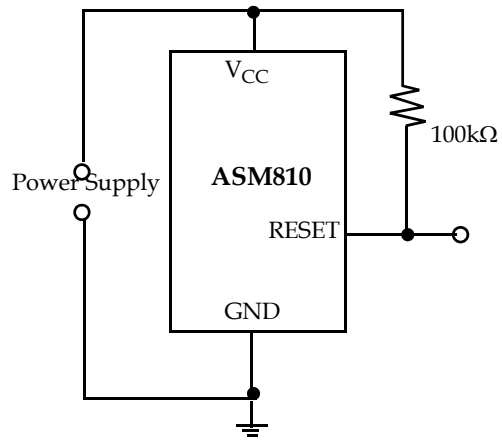


Figure 3: RESET valid with V_{CC} under 1.1V

Bidirectional Reset Pin Interfacing

The ASM809/810 can interface with µP / µC bi-directional reset pins by connecting a 4.7kΩ resistor in series with the ASM809/810 reset output and the µP/µC bi-directional reset pin.

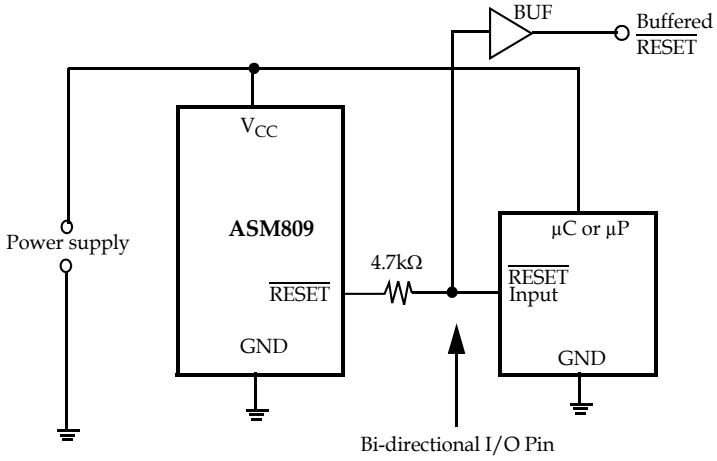


Figure 4: Bidirectional Reset Pin Interfacing

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/µs
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°C)		320	uW
Operating temperature range	-40	105	°C
Storage temperature range	-65	160	°C
Lead temperature (Soldering, 10 sec)		300	°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.			

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.

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

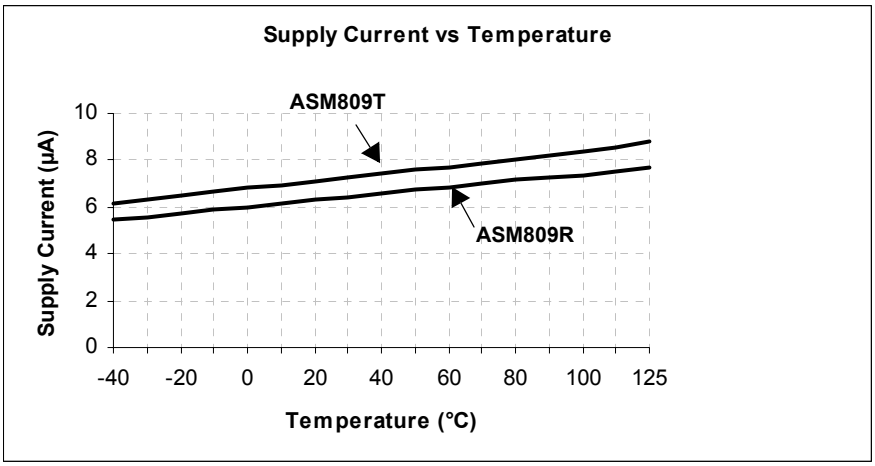
Notes:
1. Production testing done at T_A = 25°C. Over-temperature specifications guaranteed by design only, using six sigma design limits.
2. $\overline{\text{RESET}}$ output is active LOW for the ASM809 and RESET output is active HIGH for the ASM810.

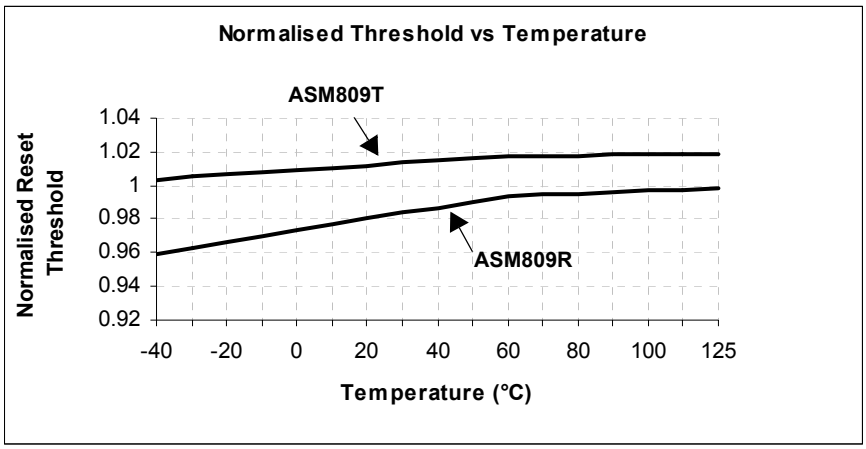
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
	Reset Active Timeout Period	T_A = -40°C to 85°C	140	240	560	ms
		T_A = 85°C to 105°C	100		840	
V_{OL}	Low $\overline{\text{RESET}}$ Output Voltage (ASM809)	V_{CC}= V_{TH} min., I_{SINK} = 1.2mA, ASM809R/S/T			0.3	V
		V_{CC}= V_{TH} min., I_{SINK} = 3.2mA,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

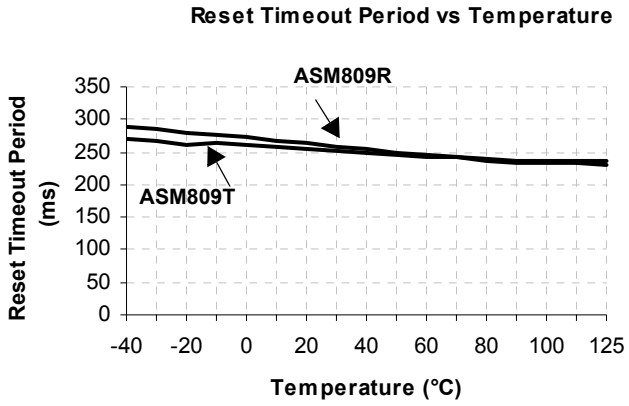
Notes:
1. Production testing done at T_A = 25°C. Over-temperature specifications guaranteed by design only, using six sigma design limits.
2. $\overline{\text{RESET}}$ output is active LOW for the ASM809 and RESET output is active HIGH for the ASM810.

Typical Operating Characteristics

Unless otherwise noted, V_{CC} is over the full voltage range, T_A = -40°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.

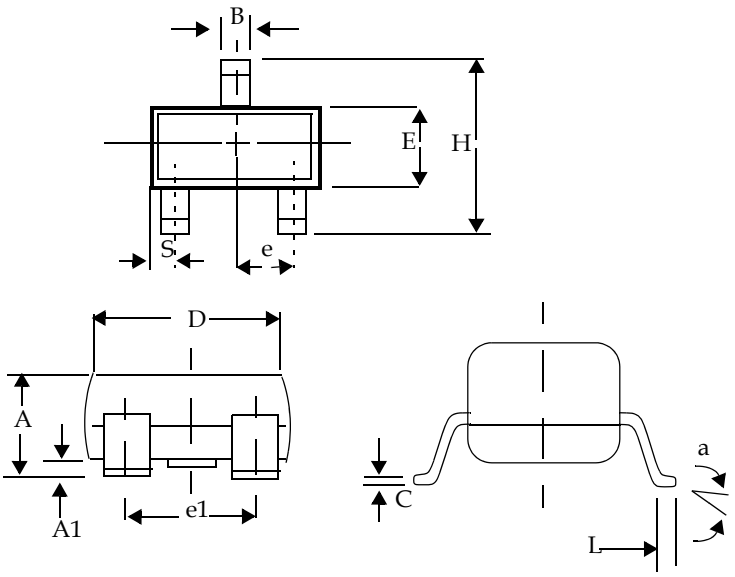






Package Dimensions

	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	0.1039	2.10	2.64
L	0.027 REF		0.069 REF	
S	0.018	0.024	0.45	0.60



Ordering Information:

Part Number [1]	Reset Threshold (V)	Temperature Range	Pin-Package	Package Marking (XX Lot Code)
ASM809 ACTIVE LOW $\overline{\text{RESET}}$				
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 $\overline{\text{RESET}}$ Output	■		■	

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