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 $\overline{RESET}$ 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:

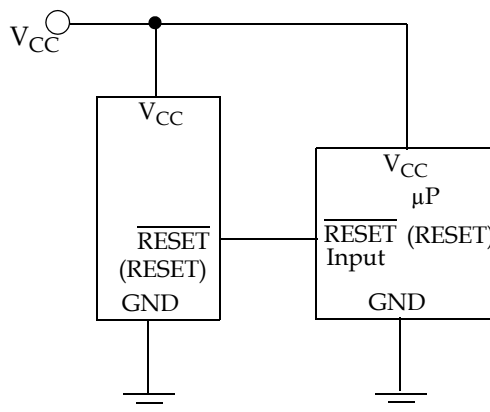| RESET THRESHOLD	
Suffix	**Voltage**
L	4.63
M	4.38
J	4.00
T	3.08
S	2.93
R	2.63

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
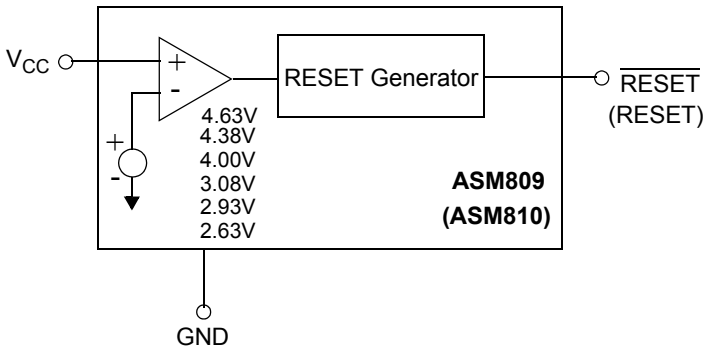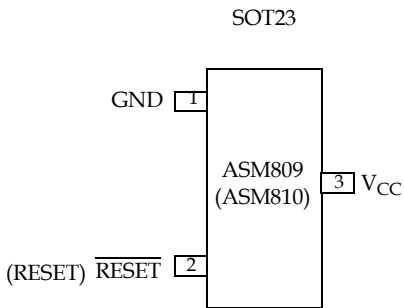- PDAs and handheld equipment
- Computers

Typical Operating Circuit

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Pin Diagram

SOT23

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.
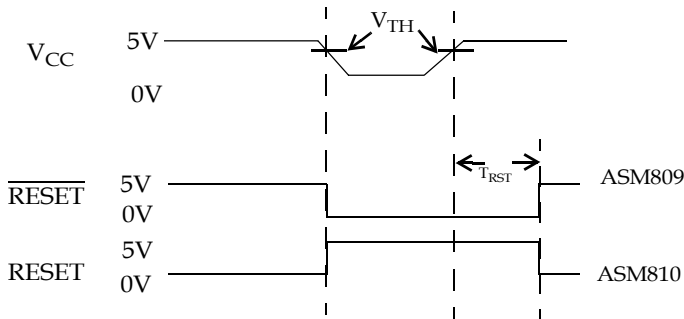

Figure 1: Reset TIming Diagram

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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 $\overline{RESET}$ pin are in a known state, a 100kΩ pull-down resistor is needed at $\overline{RESET}$. The value of the resistor is not critical. A 100kΩ pull-up resistor to V_{CC} at RESET is needed with the ASM810.
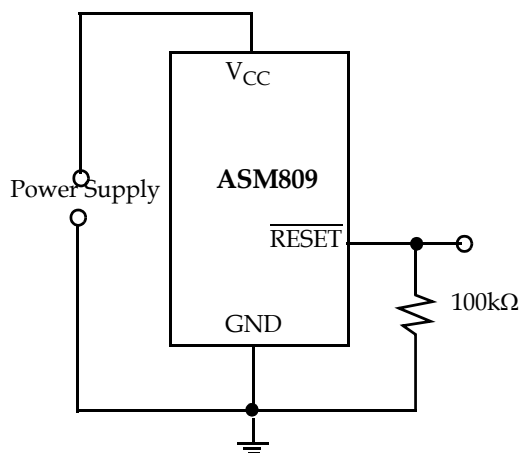
Figure 2: $\overline{RESET}$ valid with V_{CC} under 1.1V
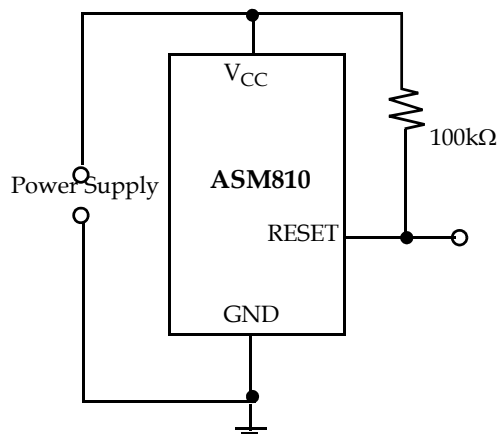
Figure 3: RESET valid with V_{CC} under 1.1V

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.
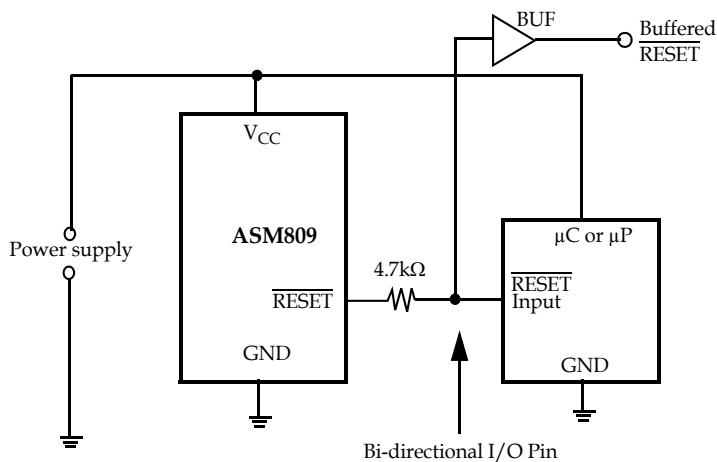

Figure 4: Bidirectional Reset Pin Interfacing

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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/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.			

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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.

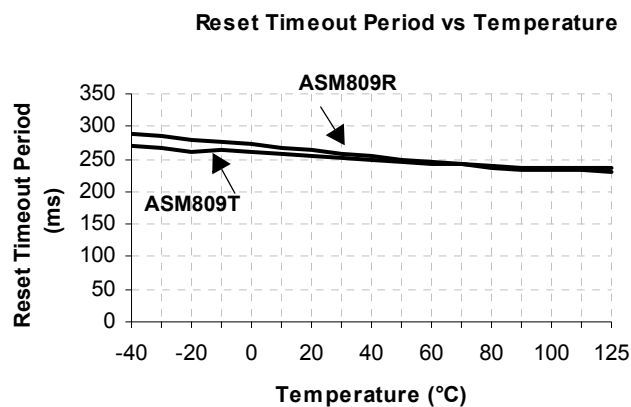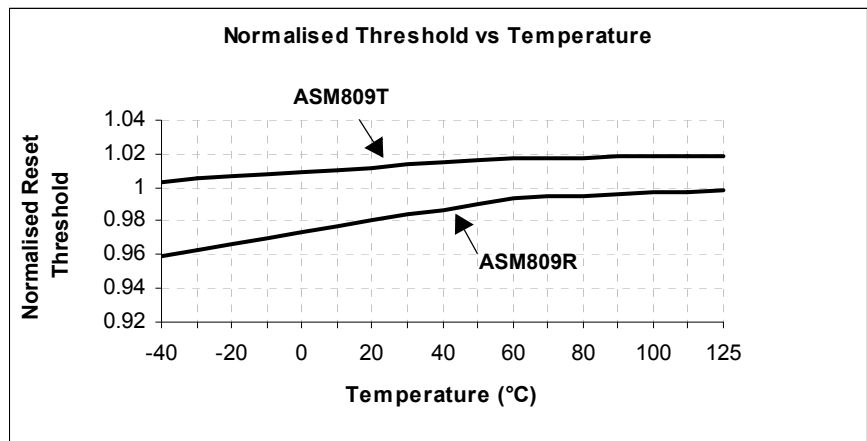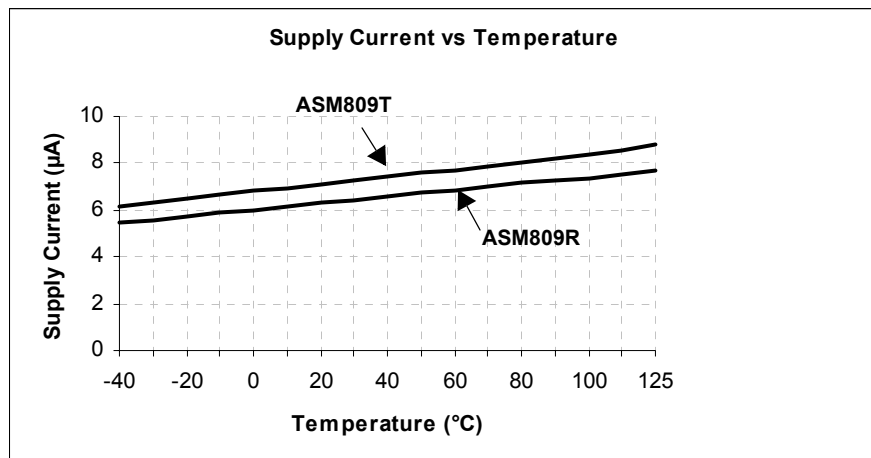| Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CC}	Input Voltage Range	T_A = 0°C to 70°C		1.1		5.5	V
		T_A = -40°C to 105°C		1.2		5.5	V
I_{CC}	Supply Current	T_A= -40°C to 85°C	V_{CC} < 5.5V, L/M/J		9	15	µA
		T_A = -40°C to 85°C	V_{CC} < 3.6V, R/S/T		6.8	10	
		T_A = 85°C to 105°C	V_{CC} < 5.5V, L/M/J			25	
		T_A = 85°C to 105°C	V_{CC} < 3.6V, R/S/T			20	
V_{TH}	Reset Threshold	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	4.40		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 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. $\overline{RESET}$ output is active LOW for the ASM809 and RESET output is active HIGH for the ASM810.

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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 $\overline{RESET}$ 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 $\overline{RESET}$ 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 $\overline{RESET}$ 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. $\overline{RESET}$ output is active LOW for the ASM809 and RESET output is active HIGH for the ASM810.

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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.

Supply Current vs Temperature

ASM809T

ASM809R

Supply Current (μA)

Temperature (°C)

Normalised Threshold vs Temperature

ASM809T

ASM809R

Normalised Reset Threshold

Temperature (°C)

Reset Timeout Period vs Temperature

ASM809R

ASM809T

Reset Timeout Period (ms)

Temperature (°C)

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

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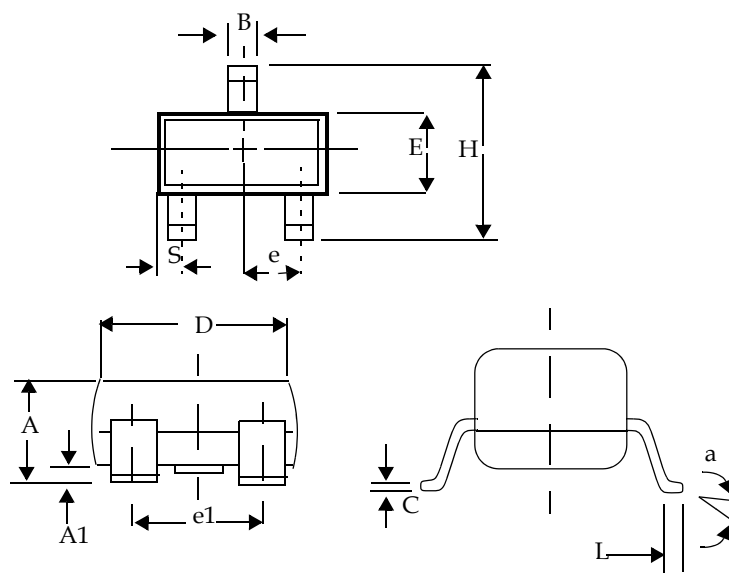
Ordering Information:

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	■		■	

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