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Low Power, 5V μ P Reset - Active LOW, Push-Pull Output

General Description

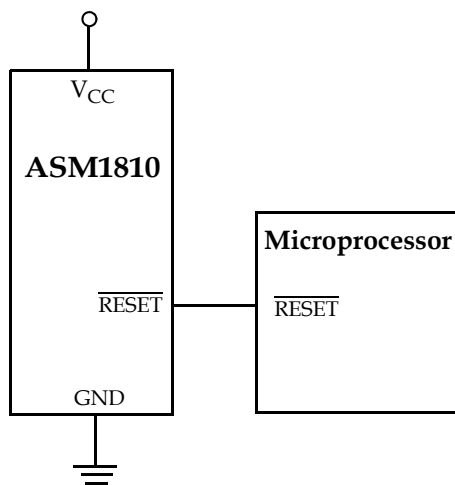
The ASM1810 is a voltage supervisor with low-power, 5V μ P active LOW Reset, Push-Pull output. Maximum supply current over temperature is a low 20 μ A.

The ASM1810 generates an active LOW reset signal whenever the monitored supply is out of tolerance. A precision reference and comparator circuit monitor power supply (V_{CC}) level. Tolerance level options are 5%, 10% and 15%. When an out-of-tolerance condition is detected, an internal power-fail signal is generated which forces an active LOW reset signal. After V_{CC} returns to an in-tolerance condition, the reset signal remains active for 150ms to allow the power supply and system microprocessor to stabilize.

The ASM1810 is designed with a push-pull output stage and operates over the extended industrial temperature range. Devices are available in compact surface mount SOT-23 packages and 3-lead TO-92 packages.

Other low power products in this family include the ASM1811/12/15/16/17, ASM1233D and ASM1233M.

Typical Operating Circuit



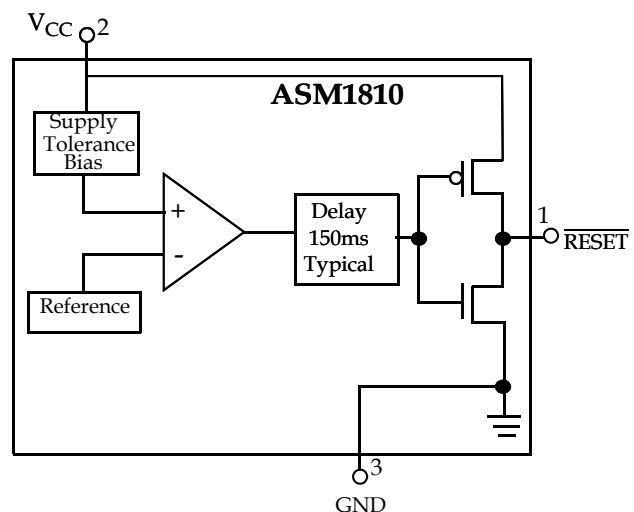
Key Features

- Low Supply Current
• 20 μ A maximum (5.5 V)
- Automatically restarts a microprocessor after power failure
- 150ms reset delay after V_{CC} returns to an in-tolerance condition
- Active LOW power-up reset
- Precision temperature-compensated voltage reference and comparator
- Eliminates external components
- Low-cost TO-92 package
- Compact surface mount SOT-23 package
- Push-Pull output for minimum current drain
- Operating temperature -40°C to +85°C

Applications

- Set-top boxes
- Cellular phones
- PDAs
- Energy management systems
- Embedded control systems
- Printers
- Single board computers

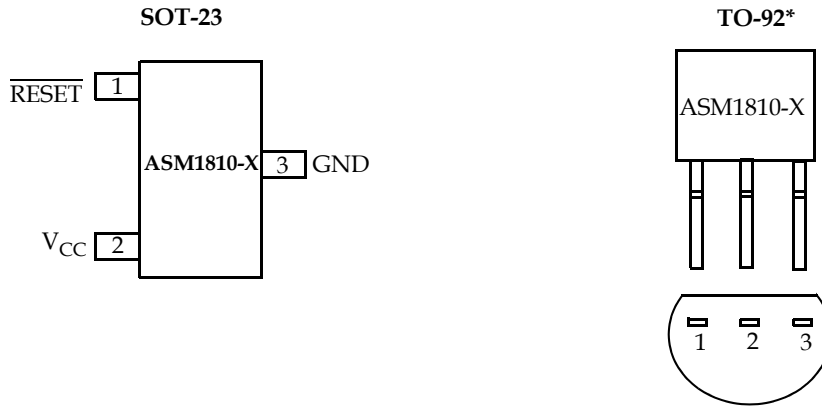
Block Diagram





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Pin Configuration



* See Ordering Information

Pin Description

Pin #	Pin Name	Description
1	$\overline{\text{RESET}}$	Active LOW reset output
2	V_{CC}	Power supply input
3	GND	Ground



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Application Information

Operation - Power Monitor

The ASM1810 detects out-of-tolerance power supply conditions. It resets a processor during power-up, power-down and issues a reset to the system processor when the monitored power supply voltage is below the reset threshold. When an out-of-tolerance V_{CC} voltage is detected, the $\overline{\text{RESET}}$ signal is asserted. On power-up, $\overline{\text{RESET}}$ is kept active (LOW) for approximately 150ms after the power supply voltage has reached the selected tolerance. This allows the power supply and microprocessor to stabilize before $\overline{\text{RESET}}$ is released.

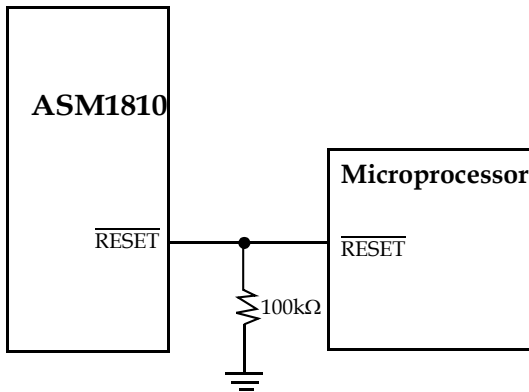


Figure 1: $\overline{\text{RESET}}$ Valid to 0V V_{CC}

Output Conditions

The ASM1810 active LOW reset signal is valid as long as V_{CC} remains below 1.2V. The $\overline{\text{RESET}}$ output on the ASM1810 uses a push-pull drive stage that can maintain a valid output below 1.2V. To sink current with V_{CC} below 1.2V, a resistor can be connected from the reset pin ($\overline{\text{RESET}}$) to Ground (see Figure 1). This configuration will give a valid value on the $\overline{\text{RESET}}$ output with V_{CC} approaching 0V. During both power up and down, this configuration will draw current when the RESET is in the high state. A value of 100kΩ should be adequate to maintain a valid connection.

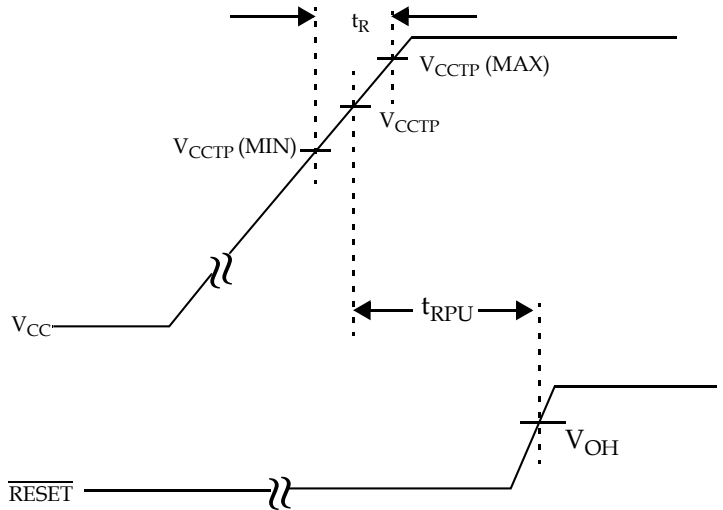


Figure 2: Timing Diagram: Power-Up

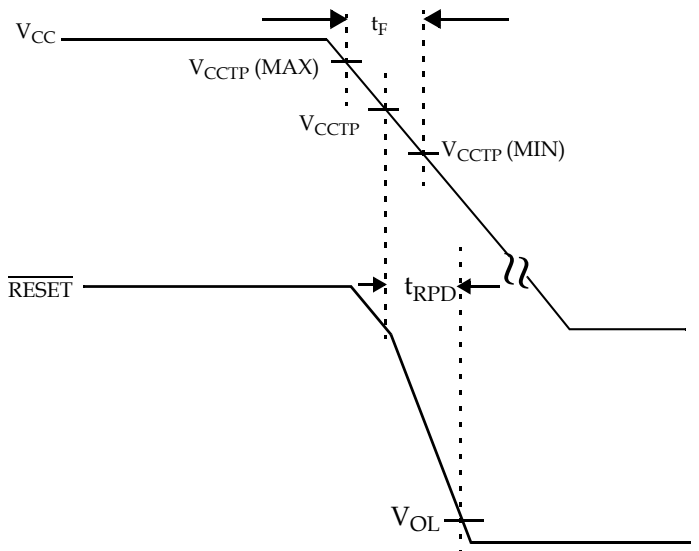


Figure 3: Timing Diagram: Power-Down



Absolute Maximum Ratings

Parameter	Min	Max	Unit
Voltage on V_{CC}	-0.5	7	V
Voltage on \overline{RESET}	-0.5	$V_{CC} + 0.5$	V
Operating Temperature Range	-40	85	°C
Soldering Temperature (for 10 sec)		260	°C
Storage Temperature	-55	125	°C

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

Electrical Characteristics

Unless otherwise noted $V_{CC} = 1.25V$ to $5.5V$ and specifications are over the operating temperature range of $-40^{\circ}C$ to $+85^{\circ}C$. All voltages are referenced to ground.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply voltage	V_{CC}		1.2		5.5	V
Output voltage	V_{OH}	$I_{OUT} < 500 \mu A$	$V_{CC} - 0.5V$	$V_{CC} - 0.1V$		V
Output Current	I_{OH}	Output = 2.4V, $V_{CC} \geq 2.7V$		350		μA
Output Current	I_{OL}	Output = 0.4V, $V_{CC} \geq 2.7V$	+10			mA
Operating Current	I_{CC}	$V_{CC} < 5.5V$, \overline{RESET} output open		8	20	μA
V_{CC} Trip Point (ASM1810-5)	V_{CCTP}		4.50	4.62	4.75	V
V_{CC} Trip Point (ASM1810-10)	V_{CCTP}		4.25	4.37	4.49	V
V_{CC} Trip Point (ASM1810-15)	V_{CCTP}		4.00	4.12	4.24	V
Output Capacitance	C_{OUT}				10	pF
V_{CC} Detect to \overline{RESET} Low	t_{RPD}			2	5	μs
V_{CC} Slew Rate (V_{CCTP} (MAX) to V_{CCTP} (MIN))	t_F		300			μs
V_{CC} Slew Rate (V_{CCTP} (MIN) to V_{CCTP} (MAX))	t_R		0			ns
V_{CC} Detect to \overline{RESET} High	t_{RPU}	$t_r = 5\mu s$	100	150	300	ms

Note: The t_F value is for reference in defining values for t_{RPD} and should not be considered for proper operation or use.



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Family Selection Guide

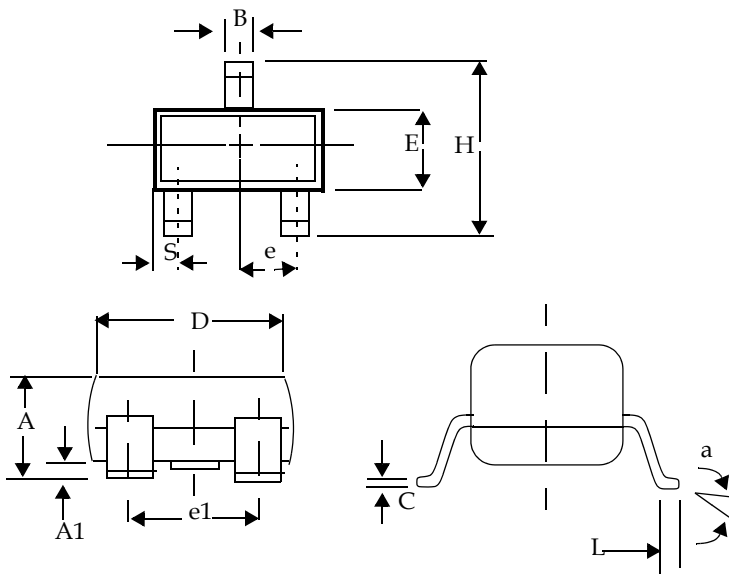
Part #	RESET Voltage (V)	RESET Time (ms)	Output Stage	RESET Polarity
ASM1810	4.620, 4.370, 4.120	150	Push-Pull	LOW
ASM1811	4.620, 4.350, 4.130	150	Open-Drain	LOW
ASM1812	4.620, 4.350, 4.130	150	Push-Pull	HIGH
ASM1815	3.060, 2.880, 2.550	150	Push-Pull	LOW
ASM1816	3.060, 2.880, 2.550	150	Open-Drain	LOW
ASM1817	3.060, 2.880, 2.550	150	Push-Pull	HIGH
ASM1233D	4.625, 4.375, 4.125	350	Open-Drain	LOW
ASM1233M	4.625, 4.375, 2.720	350	Open-Drain	LOW



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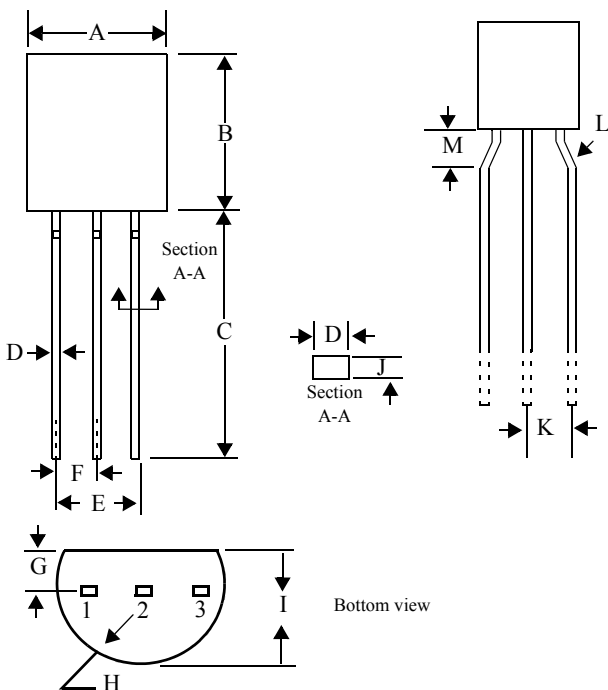
Package Dimension

Plastic SOT-23 (3-Pin)



	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

TO-92 (3-Pin)



	Inches		Millimeters	
	Min	Max	Min	Max
TO-92 (3-Pin)				
A	0.175	0.195	4.45	4.95
B	0.170	0.192	4.32	4.96
C	0.500	0.610	12.70	15.49
D	0.016	0.022	0.406	0.559
E	0.095	0.105	2.41	2.67
F	0.045	0.060	1.14	1.52
G	0.045	0.060	1.14	1.52
H	0.085	0.095	2.16	2.41
I	0.130	0.155	3.30	3.94
J	0.014	0.020	0.35	0.51
K	0.093	0.115	2.36	2.92
L	45°	60°	45°	60°
M	0.118 Typical		3.00	



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Ordering Information

Device Summary								Package Marking			
Part ** Number	RESET Output Voltage (V)	RESET Tolerance (%)	RESET Time (ms)	Push-Pull Output Stage	TO-92* Package	SOT-23 Package	RESET Polarity	A	B	C	D
ASM1810-5	4.62	5	150	u	u		LOW				
ASM1810-10	4.37	10	150	u	u		LOW				
ASM1810-15	4.12	15	150	u	u		LOW				
ASM1810R-5	4.62	5	150	u		u	LOW	B	A	X	X
ASM1810R-10	4.37	10	150	u		u	LOW	B	B	X	X
ASM1810R-15	4.12	15	150	u		u	LOW	B	C	X	X

* Add /S to Part Number for straight (unformed) leads. (i.e. ASM18xx-x/S)
 ** Add /T to Part Number for Tape and Reel (i.e ASM18xx-x/T)
 XX- Date Code



ASM1810



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Part Number: ASM1810
Document Version: 1.0

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