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

General Description

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

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 low cost TO-92 and compact surface mount SOT-23 packages.

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

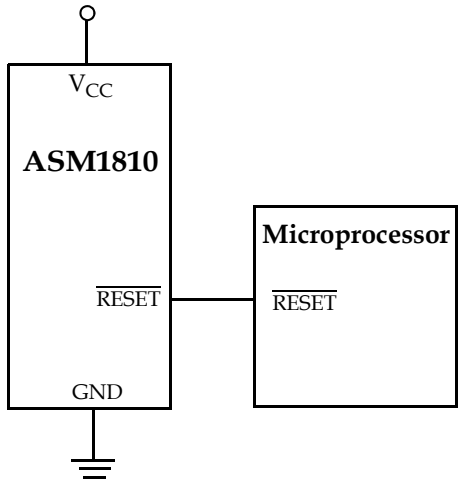
Key Features

- Low Supply Current
  •20 µA 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 and compact surface mount SOT-23 package
- Push-Pull output for minimum current drain
- Operating temperature -40°C to +85°C

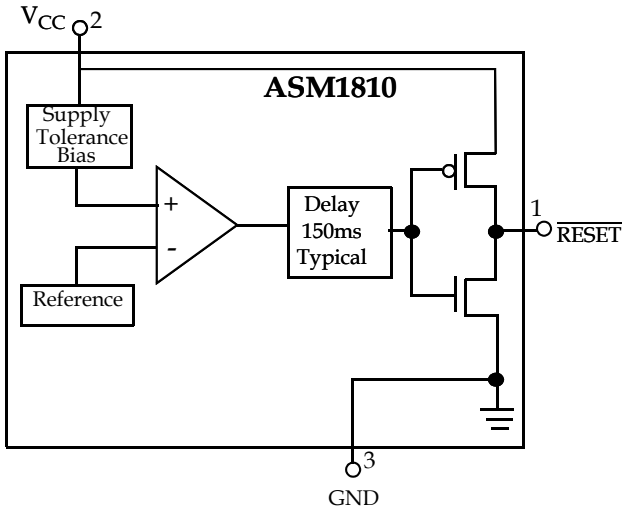
Applications

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

Typical Operating Circuit



Block Diagram



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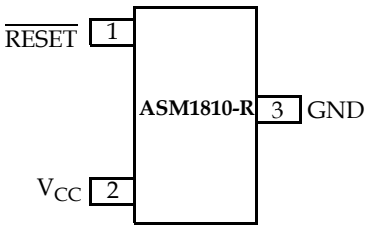
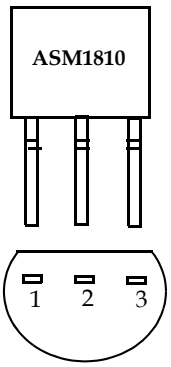
Pin Configuration

SOT-23



TO-92



Pin Description

SOT-23 Pin #	TO-92 Pin #	Pin Name	Description
1	1	$\overline{\text{RESET}}$	Active LOW reset output
2	2	V_{CC}	Power supply input
3	3	GND	Ground

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 $\overline{RESET}$ signal is asserted. On power-up, $\overline{RESET}$ 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 $\overline{RESET}$ is released.

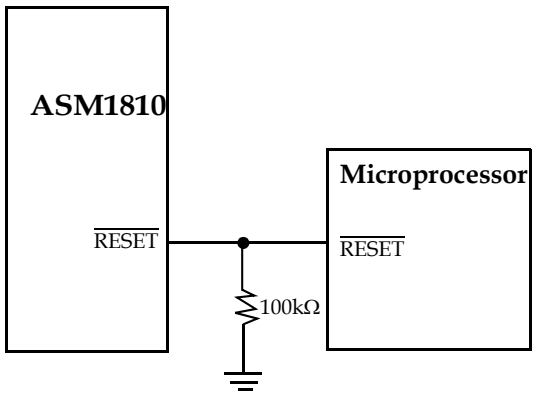


Figure 1: $\overline{RESET}$ Valid to 0V V_{CC}

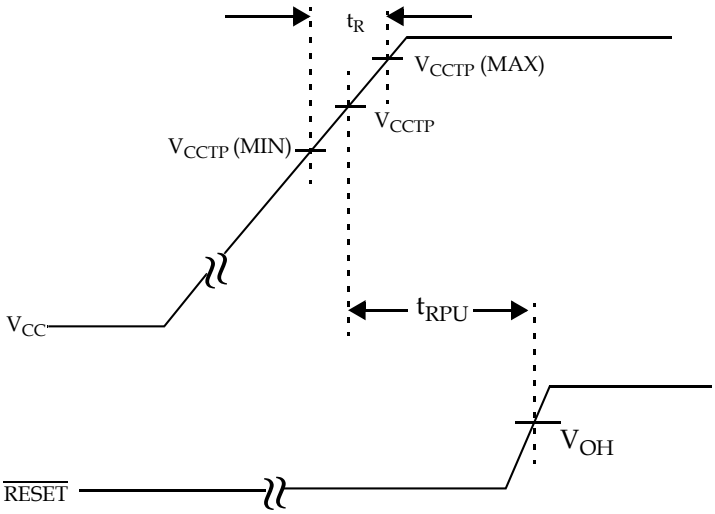


Figure 2: Timing Diagram: Power-Up

Output Conditions

The ASM1810 active LOW reset signal is valid as long as V_{CC} remains above 1.2V. However the $\overline{RESET}$ 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 ($\overline{RESET}$) to Ground (see Figure 1). This configuration will give a valid value on the $\overline{RESET}$ output with V_{CC} approaching 0V. During both power up and down, this configuration will draw current when the $\overline{RESET}$ is in the high state. A value of 100kΩ should be adequate to maintain a valid connection.

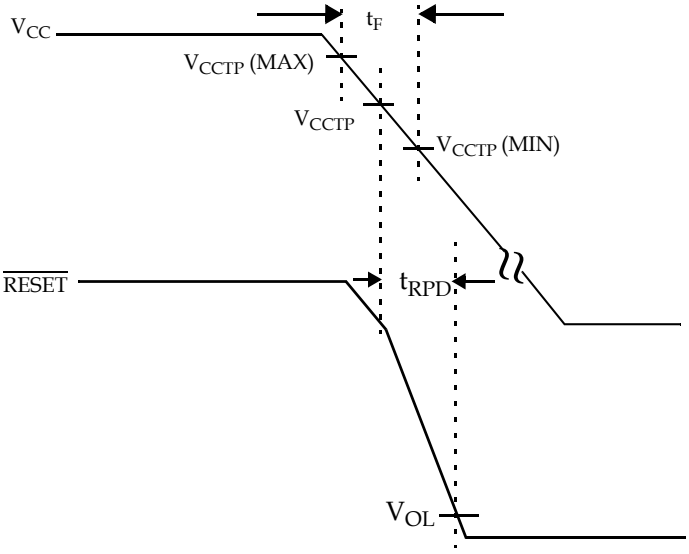


Figure 3: Timing Diagram: Power-Down

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
ESD rating HBM MM		 2 200	 KV V

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 VCC = 1.25V to 5.5V and specifications are over the operating temperature range of -40ºc to +85ºc. 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 µA	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 (ASM1810R-5)	V_{CCTP}		4.50	4.62	4.75	V
V_{CC} Trip Point (ASM1810R-10)	V_{CCTP}		4.25	4.37	4.49	V
V_{CC} Trip Point (ASM1810R-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 = 5µs	100	150	300	ms

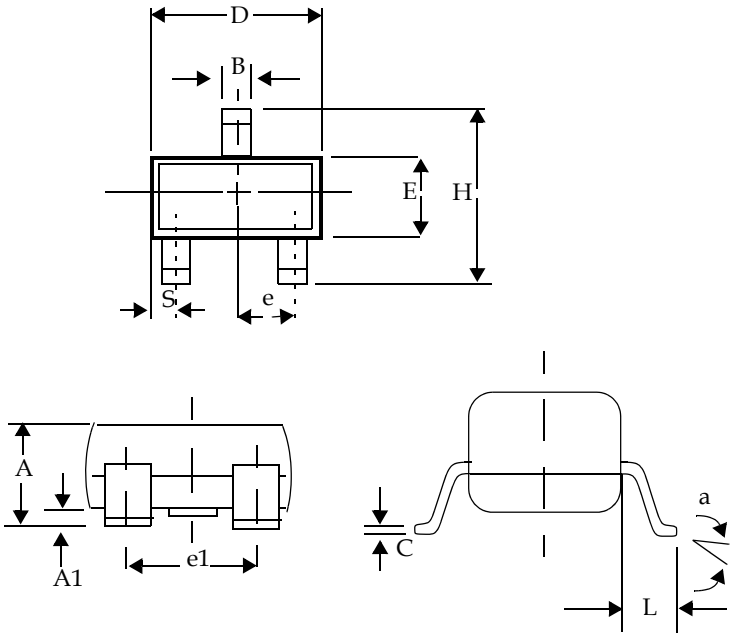
Note: The t_F value is for reference in defining values for t_{RPD} and should not be considered for proper operation or use.

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

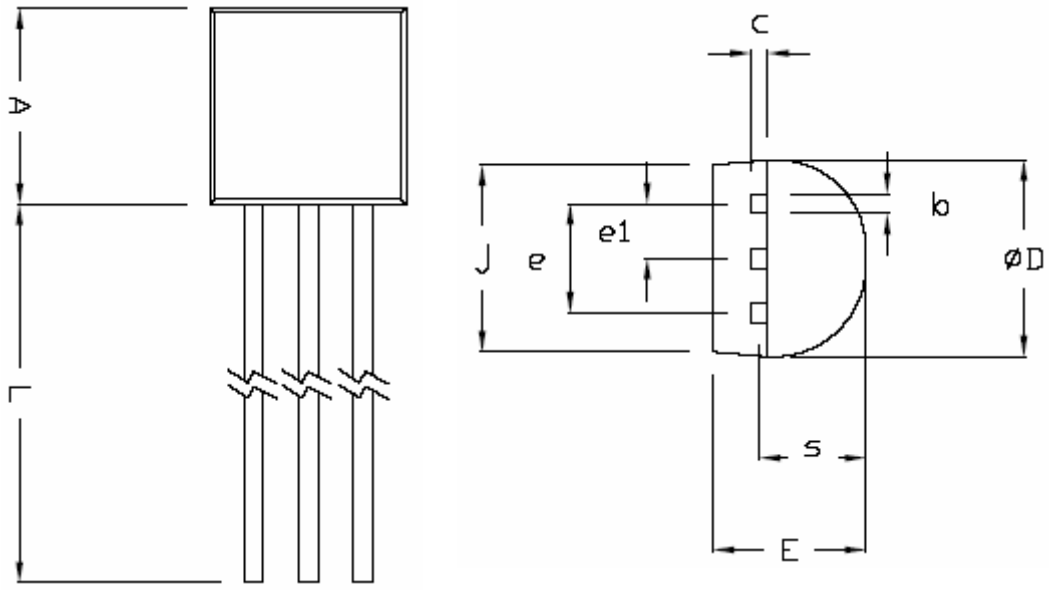
Package Dimension

Plastic SOT-23 (3-Pin)



	Inches		Millimeters	
	Min	**Max**	**Min**	**Max**
Plastic SOT-23 (3-Pin)				
A	0.030	0.046	0.75	1.17
A1	0.002	0.006	0.05	0.15
B	0.012	0.020	0.30	0.50
C	0.003	0.008	0.08	0.20
D	0.110	0.120	2.80	3.04
E	0.047	0.055	1.20	1.40
e	0.037 BSC		0.95 BSC	
e1	0.075 BSC		1.9 BSC	
H	0.083	0.104	2.10	2.64
L	0.016	0.024	0.40	0.60
a	0°	8°	0°	8°
S	NA		NA	

To-92 (3-Pin)



	Dimensions in Inches		Dimensions in Millimeters	
	Min	Max	Min	Max
TO-92				
A	0.175	0.185	4.445	4.699
b	0.016	0.020	0.406	0.508
C	0.014	0.016	0.356	0.406
ϕD	0.175	0.185	4.445	4.699
E	0.138	0.144	3.505	3.658
e	0.098	0.102	2.489	2.591
e1	0.045	0.055	1.143	1.397
j	0.168	0.174	4.269	4.420
L	0.500	0.585	12.7	14.86
s	0.095	0.099	2.413	2.515

Ordering Information

Device Summary							
Part ** Number	**RESET Output Voltage (V)**	**RESET Tolerance (%)**	**RESET Time (ms)**	**Push-Pull Output Stage**	**SOT-23 Package**	**RESET Polarity**	**Package Marking**
TIN - LEAD DEVICES							
ASM1810R-5	4.62	5	150	◆	◆	LOW	RALL
ASM1810R-10	4.37	10	150	◆	◆	LOW	RBLL
ASM1810R-15	4.12	15	150	◆	◆	LOW	RCLL
LEAD FREE DEVICES							
ASM1810R-5F	4.62	5	150	◆	◆	LOW	KALL
ASM1810R-10F	4.37	10	150	◆	◆	LOW	KBLL
ASM1810R-15F	4.12	15	150	◆	◆	LOW	KCLL
Part ** Number	**RESET Output Voltage (V)**	**RESET Tolerance (%)**	**RESET Time (ms)**	**Push-Pull Output Stage**	**TO-92 Package**	**RESET Polarity**	**Package Marking**
TIN - LEAD DEVICES							
ASM1810-5	4.62	5	150	◆	◆	LOW	ASM1810-5
ASM1810-10	4.37	10	150	◆	◆	LOW	ASM1810-10
ASM1810-15	4.12	15	150	◆	◆	LOW	ASM1810-15
LEAD FREE DEVICES							
ASM1810-5F	4.62	5	150	◆	◆	LOW	ASM1810-5F
ASM1810-10F	4.37	10	150	◆	◆	LOW	ASM1810-10F
ASM1810-15F	4.12	15	150	◆	◆	LOW	ASM1810-15F

** Add /T to Part Number for Tape and Reel (i.e ASM18xx-x/T)
LL - Lot Code

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