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## Low Power, 5V $\mu$ P Reset - Active LOW, Push-Pull Output

### General Description

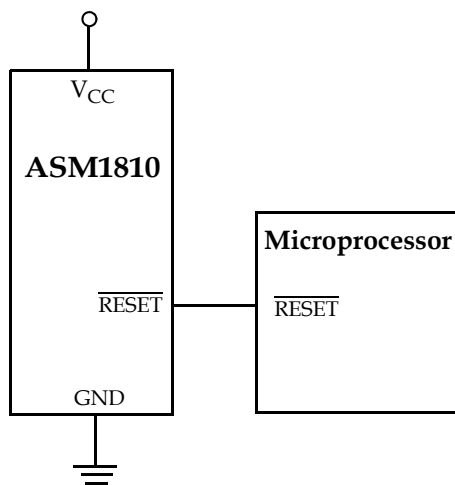
The ASM1810 is a voltage supervisor with low-power, 5V  $\mu$ P active LOW Reset, Push-Pull output. Maximum supply current over temperature is a low 20 $\mu$ A.

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 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.

### Typical Operating Circuit



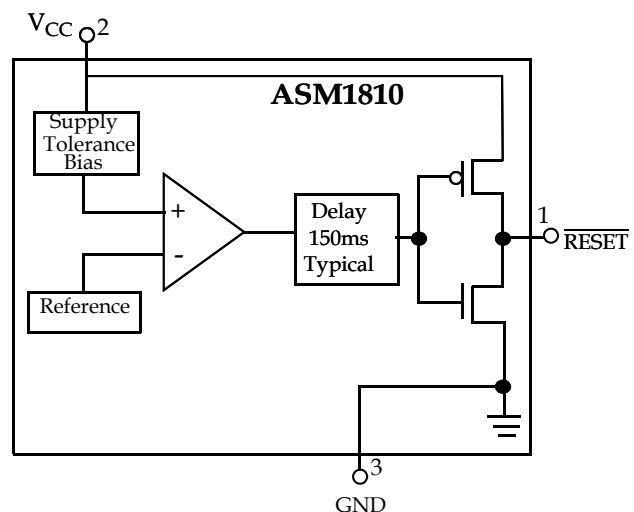
### Key Features

- Low Supply Current  
• 20  $\mu$ 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 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

### Block Diagram





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**Pin Configuration**



**Pin Description**

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

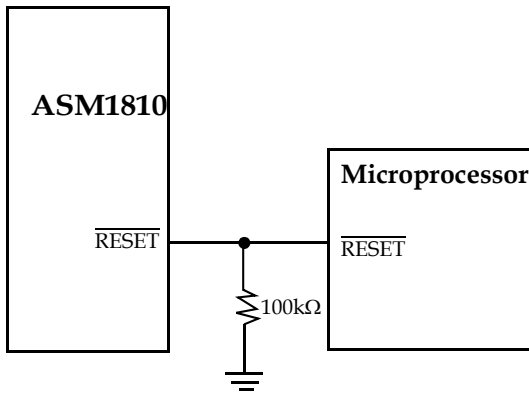


Figure 1:  $\overline{\text{RESET}}$  Valid to 0V  $V_{CC}$

**Output Conditions**

The ASM1810 active LOW reset signal is valid as long as  $V_{CC}$  remains above 1.2V. However 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  $\overline{\text{RESET}}$  is in the high state. A value of 100kΩ should be adequate to maintain a valid connection.

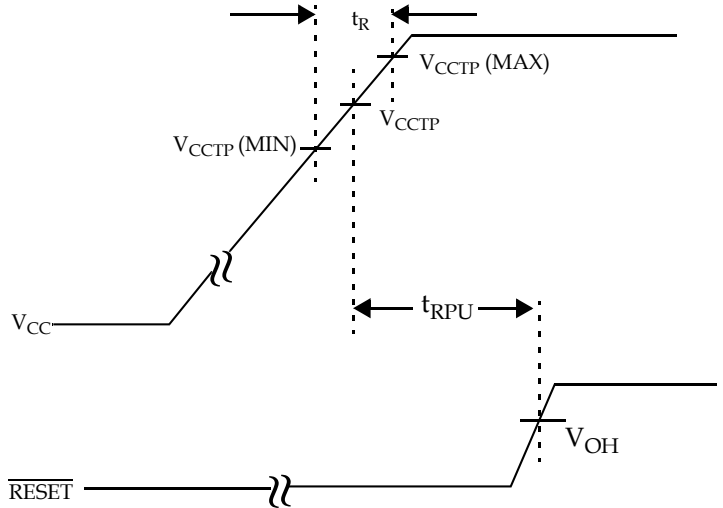


Figure 2: Timing Diagram: Power-Up

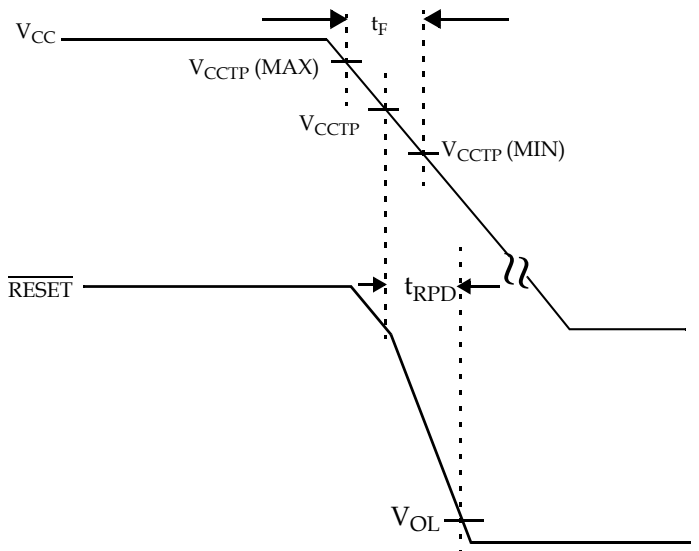


Figure 3: Timing Diagram: Power-Down



## 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
ESD rating			
	HBM	2	KV
	MM	200	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  $V_{CC} = 1.25V$  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		$\mu A$
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	$\mu A$
$V_{CC}$ 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	$\mu s$
$V_{CC}$ Slew Rate ( $V_{CCTP}$ (MAX) to $V_{CCTP}$ (MIN))	$t_F$		300			$\mu s$
$V_{CC}$ Slew Rate ( $V_{CCTP}$ (MIN) to $V_{CCTP}$ (MAX))	$t_R$		0			ns
$V_{CC}$ Detect to $\overline{RESET}$ High	$t_{RPU}$	$t_f = 5\mu s$	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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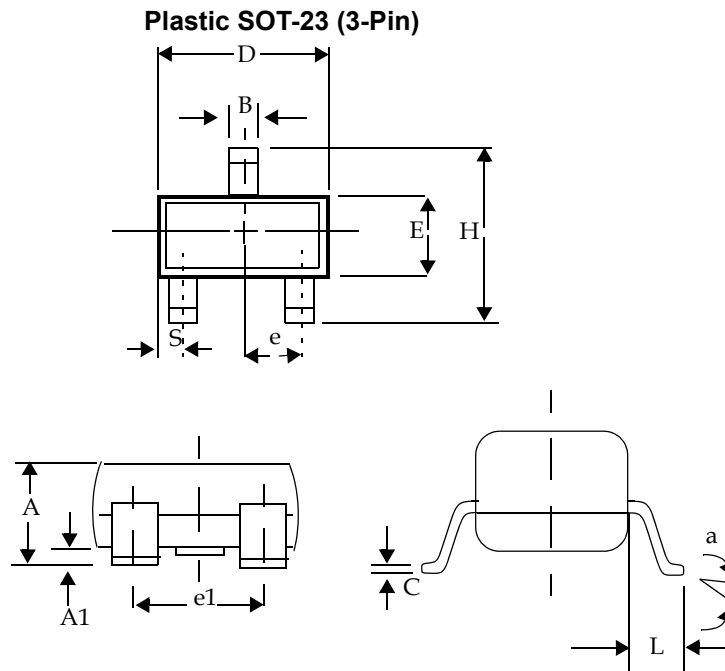
### Family Selection Guide

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

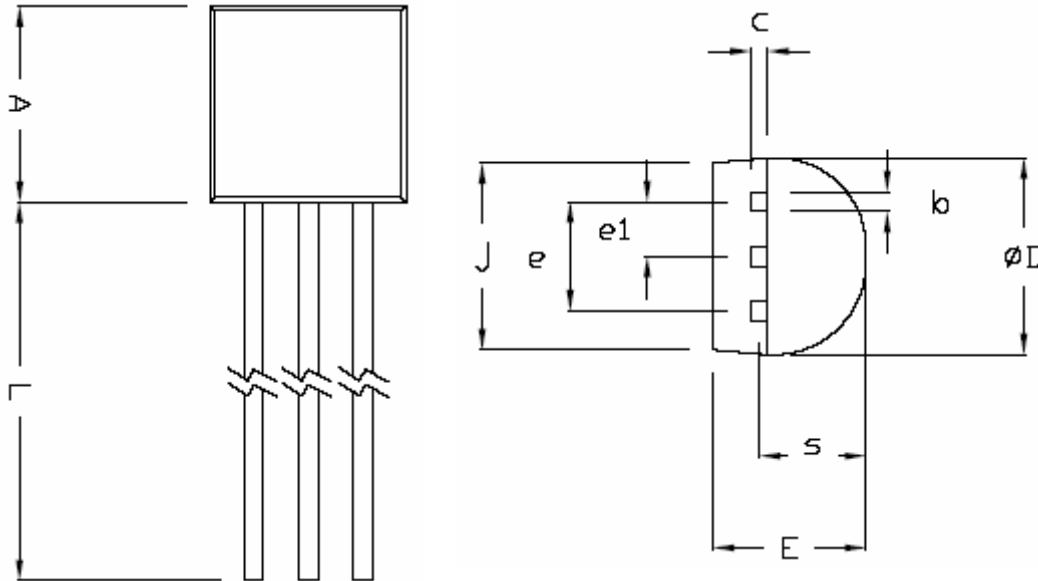


	Inches		Millimeters	
	Min	Max	Min	Max
<b>Plastic SOT-23 (3-Pin)</b>				
A	0.030	0.046	0.75	1.17
A1	0.002	0.006	0.05	0.15
B	0.012	0.020	0.30	0.50
C	0.003	0.008	0.08	0.20
D	0.110	0.120	2.80	3.04
E	0.047	0.055	1.20	1.40
e	0.037 BSC		0.95 BSC	
e1	0.075 BSC		1.9 BSC	
H	0.083	0.104	2.10	2.64
L	0.016	0.024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



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To-92 (3-Pin)



	Dimensions in Inches		Dimensions in Millimeters	
	Min	Max	Min	Max
<b>TO-92</b>				
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
$\phi D$	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



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## 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
<b>TIN - LEAD DEVICES</b>							
ASM1810R-5	4.62	5	150	◆	◆	LOW	RALL
ASM1810R-10	4.37	10	150	◆	◆	LOW	RBLL
ASM1810R-15	4.12	15	150	◆	◆	LOW	RCLL
<b>LEAD FREE DEVICES</b>							
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
<b>TIN - LEAD DEVICES</b>							
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
<b>LEAD FREE DEVICES</b>							
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							





**ASM1810**



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