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**Low Power 5V  $\mu$ P Reset Active HIGH, Push-Pull Output**

**General Description**

The ASM1812 is a voltage supervisory device with low-power, 5V  $\mu$ P Reset, active HIGH, Push-Pull output. Maximum supply current over temperature is a low 20 $\mu$ A.

The ASM1812 issues an active HIGH 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 HIGH 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 ASM1812 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 ASM1810/11/15/16/17, ASM1233D and ASM1233M.

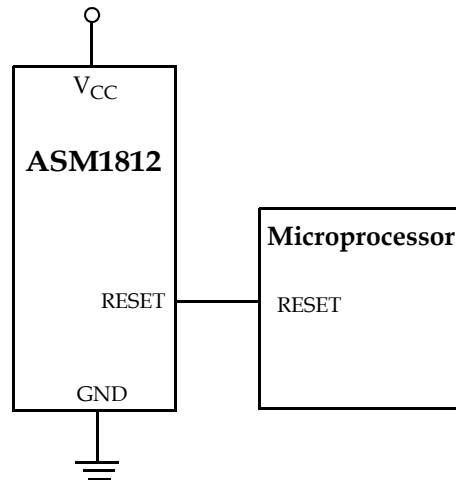
**Key Features**

- 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 HIGH 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

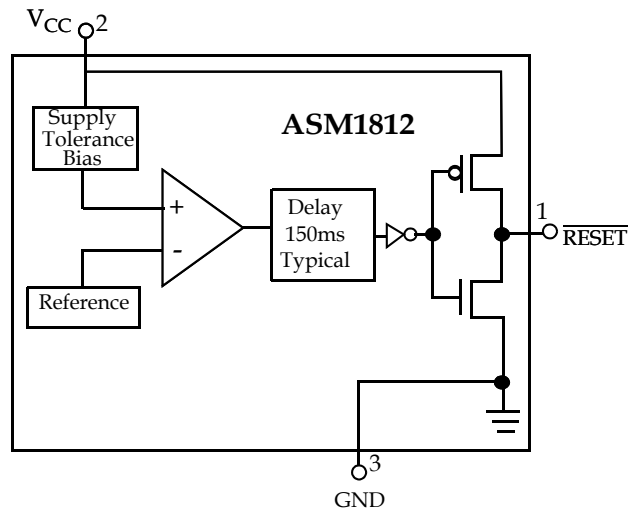
**Applications**

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

**Typical Operating Circuit**



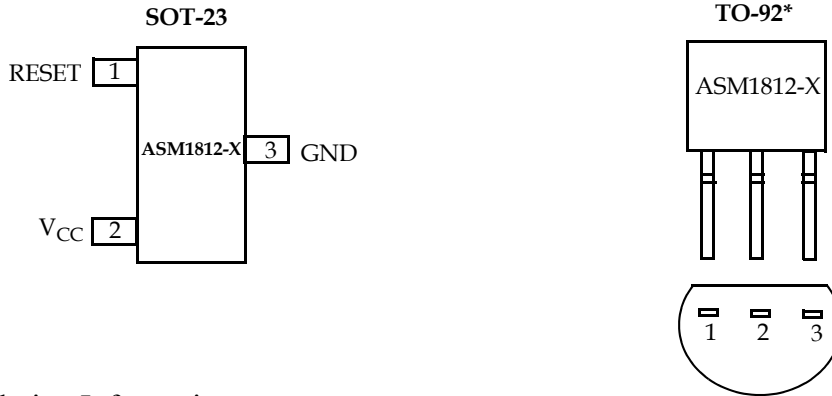
**Block Diagram**





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**Pin Configuration**



\* See Ordering Information

**Pin Description**

Pin #	Pin Name	Description
1	RESET	Active HIGH reset output
2	V <sub>CC</sub>	Power supply input
3	GND	Ground



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**Application Information**

**Operation - Power Monitor**

The ASM1812 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 RESET signal is asserted. On power-up, RESET is kept active (HIGH) for approximately 150ms after the power supply voltage has reached the selected tolerance. This allows the power supply and microprocessor to stabilize before RESET is released.

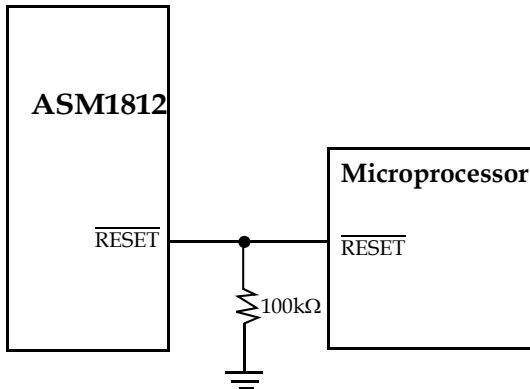


Figure 1:  $\overline{\text{RESET}}$  Valid to 0V  $V_{CC}$

**Output Conditions**

The ASM1812 active LOW reset signal is valid as long as  $V_{CC}$  remains below 1.2V. The  $\overline{\text{RESET}}$  output on the ASM1812 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.

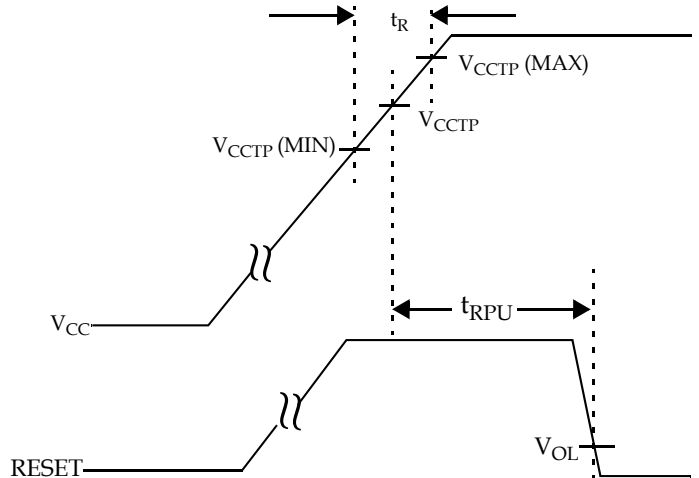


Figure 2: Timing Diagram: Power-Up

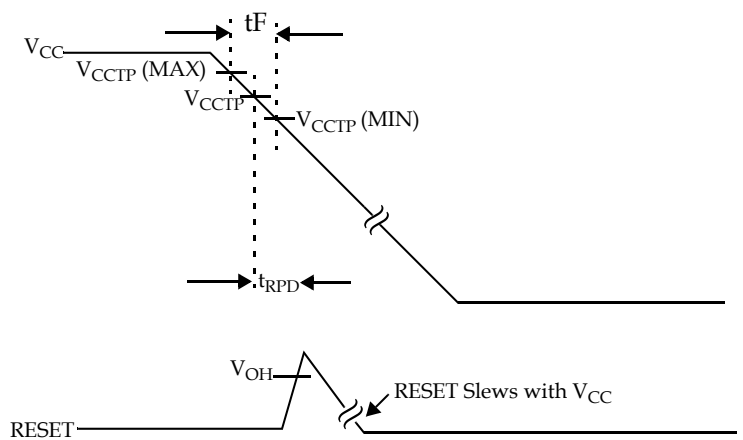


Figure 3: Timing Diagram: Power-Down



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### Absolute Maximum Ratings

Parameter	Min	Max	Unit
Voltage on $V_{CC}$	-0.5	7	V
Voltage on 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,  $V_{CC} = 1.2V$  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		8	20	$\mu A$
$V_{CC}$ Trip Point (ASM1812-5)	$V_{CCTP}$		4.50	4.62	4.75	V
$V_{CC}$ Trip Point (ASM1812-10)	$V_{CCTP}$		4.25	4.35	4.49	V
$V_{CC}$ Trip Point (ASM1812-15)	$V_{CCTP}$		4.00	4.13	4.24	V
Output Capacitance	$C_{OUT}$				10	pF
RESET Active Time	$t_{RESET}$		100	150	250	ms
$V_{CC}$ Detect to RESET Low	$t_{RPD}$			2	5	$\mu s$
$V_{CC}$ Slew Rate	$t_F$		300			$\mu s$
$V_{CC}$ Slew Rate	$t_R$		0			ns
$V_{CC}$ Detect to 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

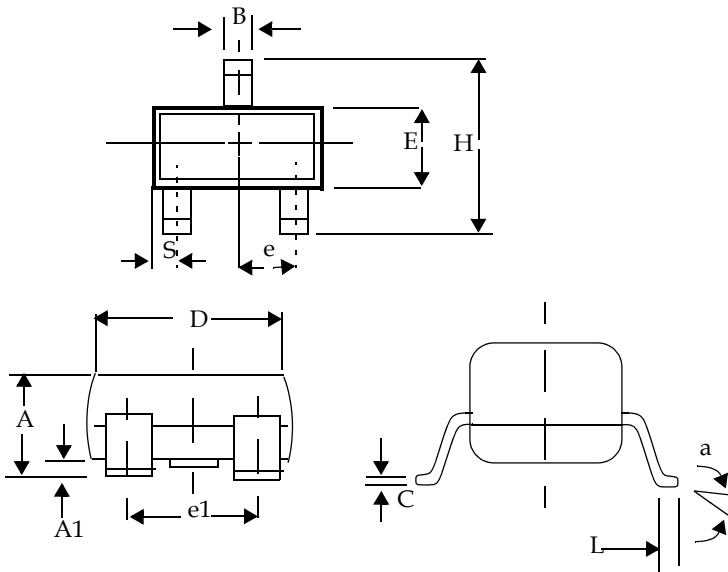
Part #	RESET Voltage (V)	RESET Time (ms)	Output Stage	RESET Polarity
ASM1810	4.620, 4.370, 4.120	150	Push-Pull	LOW
ASM1811	4.620, 4.350, 4.130	150	Open-Drain	LOW
ASM1812	4.620, 4.350, 4.130	150	Push-Pull	HIGH
ASM1815	3.060, 2.880, 2.550	150	Push-Pull	LOW
ASM1816	3.060, 2.880, 2.550	150	Open-Drain	LOW
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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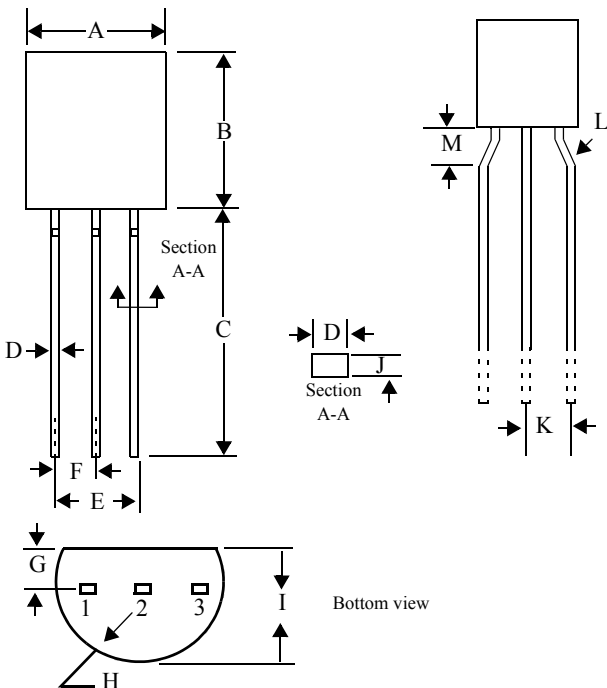
Package Dimension

Plastic SOT-23 (3-Pin)



	Inches		Millimeters	
	Min	Max	Min	Max
<b>Plastic SOT-23 (3-Pin)</b>				
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
<b>TO-92 (3-Pin)</b>				
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 Codes

Device Summary								Package Marking			
Part ** Number	RESET Output Voltage (V)	RESET Tolerance (%)	RESET Time (ms)	Push-Pull Output Stage	TO-92*	SOT-23 Package	RESET Polarity	A	B	C	D
ASM1812-5	4.62	5	150	◆	◆		HIGH				
ASM1812-10	4.35	10	150	◆	◆		HIGH				
ASM1812-15	4.13	15	150	◆	◆		HIGH				
ASM1812R-5	4.62	5	150	◆		◆	HIGH	D	A	X	X
ASM1812R-10	4.35	10	150	◆		◆	HIGH	D	B	X	X
ASM1812R-15	4.13	15	150	◆		◆	HIGH	D	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											



**ASM1812**



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