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**Low Power, 5V/3.0V,  $\mu$ P Reset, Active LOW, Open-Drain Output**

**General Description**

The ASM1233M is a voltage supervisor with low-power, 5V  $\mu$ P Reset, with an active LOW, open-drain output. Maximum supply current over temperature is a low 20 $\mu$ A.

The ASM1233M 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% ,and 10% for a 5V power supply. The tolerance is 15% for the 3.3V, ASM1233M. 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 350ms to allow the power supply and system microprocessor to stabilize.

The ASM1233M is designed with a open-drain output stage and operates over the extended industrial temperature range. Devices are available in compact surface mount SO-8 packages and 3-lead TO-92 packages.

Other low power products in this family include the ASM1810/11/12/15/16/17 and ASM1233D.

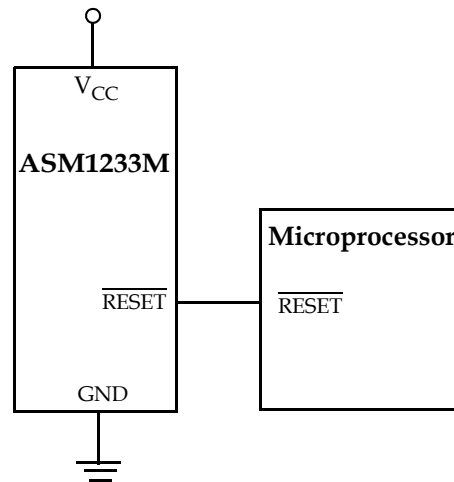
**Key Features**

- Low Supply Current
  - 20  $\mu$ A maximum (5.5 V)
  - 15 $\mu$ A maximum (3.6 V)
- Automatically restarts a microprocessor after power failure
- 350ms reset delay after  $V_{CC}$  returns to an in-tolerance condition
- Active LOW power-up reset, 5k $\Omega$  internal pull-up
- Precision temperature-compensated voltage reference and comparator
- Eliminates external components
- Low-cost TO-92 package
- Compact surface mount SO-8 package
- Operating temperature -40 $^{\circ}$ C to +85 $^{\circ}$ C

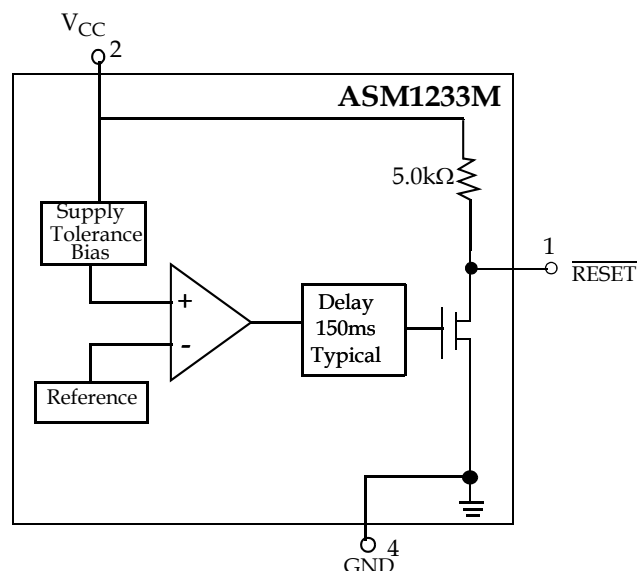
**Applications**

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

**Typical Operating Circuit**



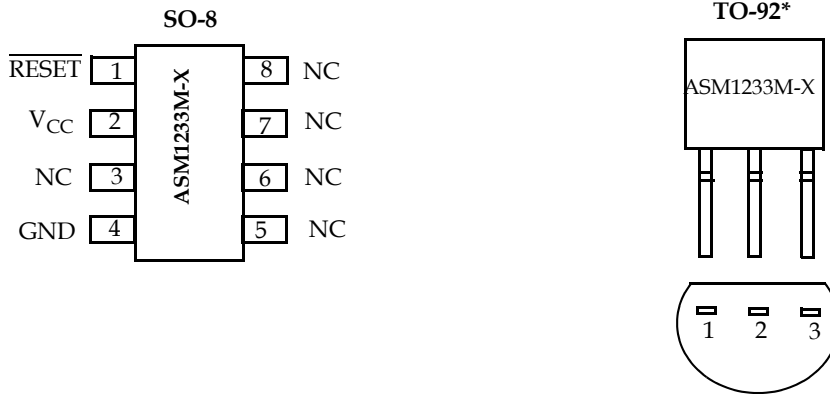
**Block Diagram**





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**Pin Configuration**



**Pin Description**

Pin #		Pin Name	Description
SO-8	TO-92		
1	1	RESET	Active LOW reset output
2	2	V <sub>CC</sub>	Power supply input
3, 5, 6, 7 and 8	-	NC	No Connection.
4	3	GND	Ground.

\* See Ordering Information



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**Application Information**

**Operation - Power Monitor**

The ASM1233M detects out-of-tolerance power supply conditions. It resets a processor during power-up, power-down and generates 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 350ms 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.

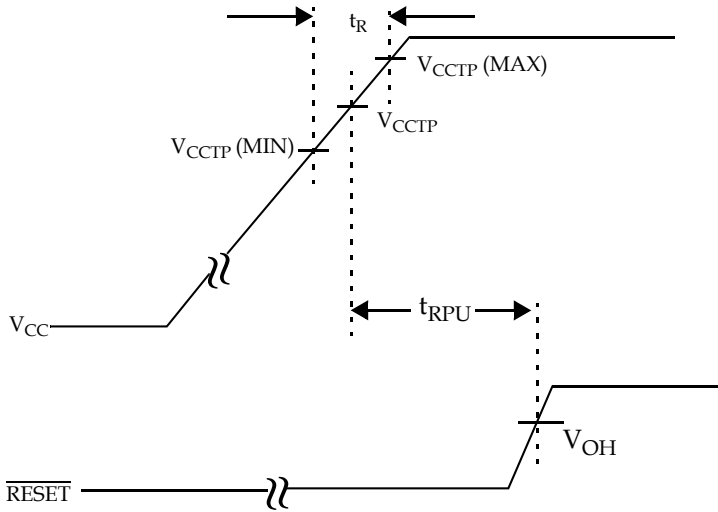


Figure 1: Timing Diagram: Power-Up

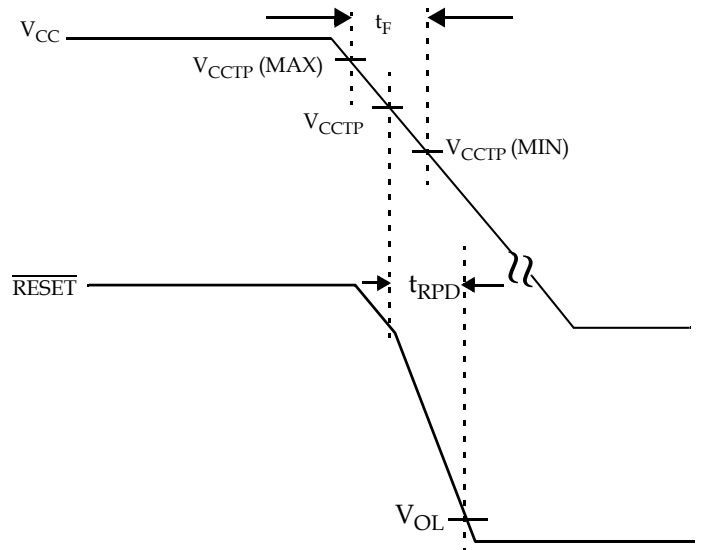


Figure 2: Timing Diagram: Power-Down



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**Absolute Maximum Ratings**

Parameter	Min	Max	Unit
Voltage on $V_{CC}$	-0.5	7	V
Voltage on $\overline{RESET}$	-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.



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## 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	$I_{OL}$	Output = 0.4V, $V_{CC} \geq 2.7V$	+8			mA
Operating Current	$I_{CC}$	$V_{CC} < 5.5V$ , $\overline{RESET}$ output open		8	20	$\mu A$
Operating Current	$I_{CC}$	$V_{CC} < = 3.6V$ , $\overline{RESET}$ output open		6	15	$\mu A$
$V_{CC}$ Trip Point (ASM1233M-5)	$V_{CCTP}$		4.25	4.375	4.49	V
$V_{CC}$ Trip Point (ASM1233M-55)	$V_{CCTP}$		4.5	4.625	4.75	V
$V_{CC}$ Trip Point (ASM1233M-3)	$V_{CCTP}$		2.64	2.72	2.8	V
Voltage High Trip Level ASM1233M-5 ASM1233M-55	$V_{HTL}$				4.75	V
Voltage Low Trip Level ASM1233M-5 ASM1233M-55	$V_{LTL}$				4.00	V
Voltage High Trip Level ASM1233M-3	$V_{HTL}$				3.14	V
Internal Pull-up Resistor	$R_P$		3.5	5.0	7.5	k $\Omega$
Output Capacitance	$C_{OUT}$				10	pF
$V_{CC}$ Detect to $\overline{RESET}$ Low	$t_{RPD}$			2	10	$\mu s$
$V_{CC}$ Slew Rate ( $V_{HTL} - V_{LTL}$ )	$t_F$		300			$\mu s$
$V_{CC}$ Slew Rate ( $V_{LTL} - V_{HTL}$ )	$t_R$		0			ns
$V_{CC}$ Detect to $\overline{RESET}$ High	$t_{RPU}$	$t_r = 5\mu s$	200	350	500	ms

Note: A 1k $\Omega$  resistor maybe required in some applications for proper operation of the microprocessor reset control circuit.



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## Family Selection Guide

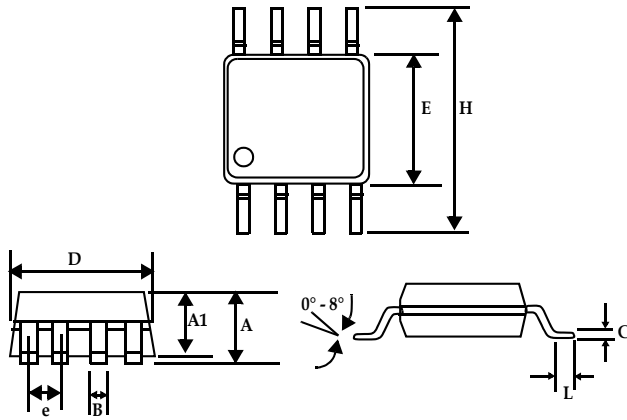
Part #	RESET Voltage (V)	RESET Time (ms)	Output Stage	RESET Polarity
ASM1810	4.620, 4.370, 4.120	150	Push-Pull	LOW
ASM1811	4.620, 4.350, 4.130	150	Open-Drain	LOW
ASM1812	4.620, 4.350, 4.130	150	Push-Pull	HIGH
ASM1815	3.060, 2.880, 2.550	150	Push-Pull	LOW
ASM1816	3.060, 2.880, 2.550	150	Open-Drain	LOW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



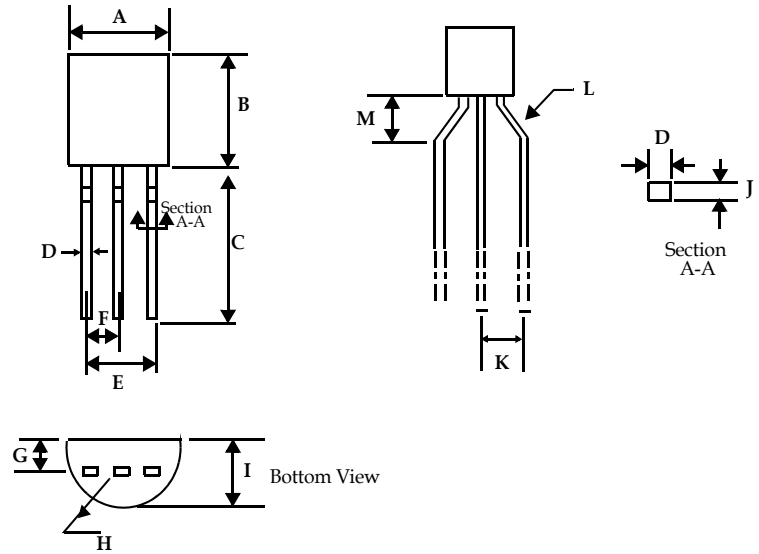
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Package Information

Plastic SO-8 (8-Pin)



TO-92 (3-Pin)



	Inches		Millimeters	
	Min	Max	Min	Max
Plastic SO-8 (8-Pin)				
A	0.053	0.069	1.35	1.75
A1	0.004	0.010	0.10	0.25
B	0.013	0.020	0.33	0.51
C	0.007	0.010	0.19	0.25
e	0.050		1.27	
E	0.150	0.157	3.80	4.00
H	0.228	0.244	5.80	6.20
L	0.016	0.050	0.40	1.27
D	0.189	0.197	4.80	2.00

	Inches		Millimeters	
	Min	Max	Min	Max
Plastic SO-8 (8-Pin)				
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	0.60	1.14	1.52
G	0.45	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							
Part Number	RESET Output Voltage (V)	RESET Tolerance (%)	RESET Time (ms)	Open-Drain Output Stage**	TO-92 Package*	SO-8 Package	RESET Polarity
ASM1233M-55	4.625	5	350	◆	◆		LOW
ASM1233M-5	4.375	10	350	◆	◆		LOW
ASM1233M-3	2.720	15	350	◆	◆		LOW
ASM1233MS-55	4.625	5	350	◆		◆	LOW
ASM1233MS-5	4.375	10	350	◆		◆	LOW
ASM1233MS-3	2.720	15	350	◆		◆	LOW

\* Add /S to Part Number for straight (unformed) leads. (i.e. ASM1233xx-x/S)  
 \*\* Internal 5kΩ resistor pull-up





**ASM1233M**



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