



October 2003

ASM1233M

rev 1.0

Low Power, 5V/3.0V, μ P Reset, Active LOW, Open-Drain Output

General Description

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

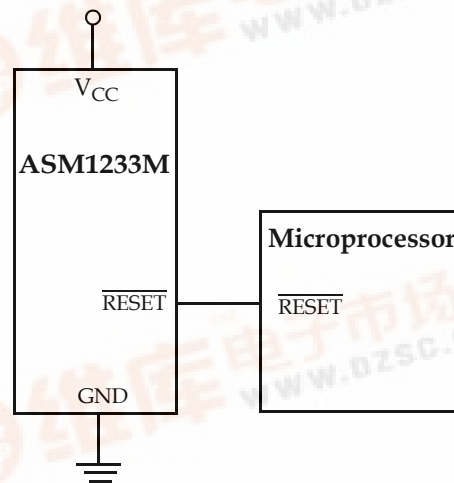
Key Features

- Low Supply Current
 - 20 μ A maximum (5.5 V)
 - 15 μ 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 Ω 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°C to +85°C

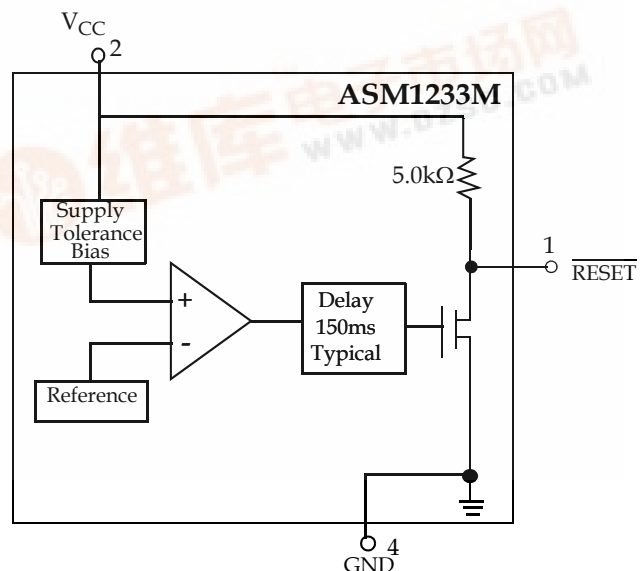
Applications

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

Typical Operating Circuit



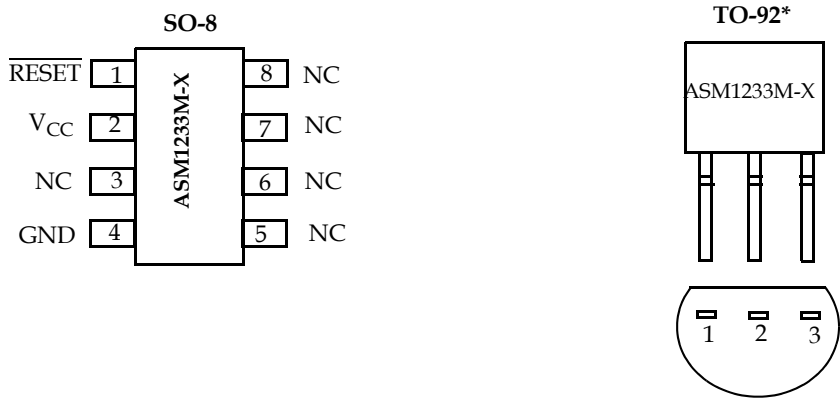
Block Diagram





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Pin Configuration



Pin Description

Pin #		Pin Name	Description
SO-8	TO-92		
1	1	RESET	Active LOW reset output
2	2	V _{CC}	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.

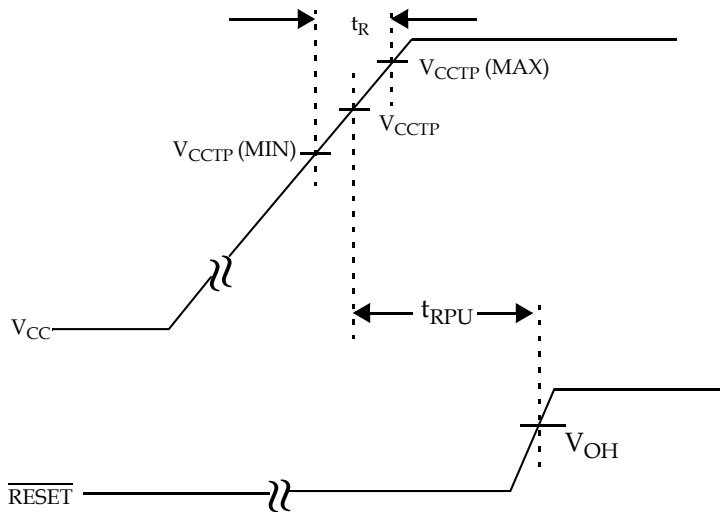


Figure 1: Timing Diagram: Power-Up

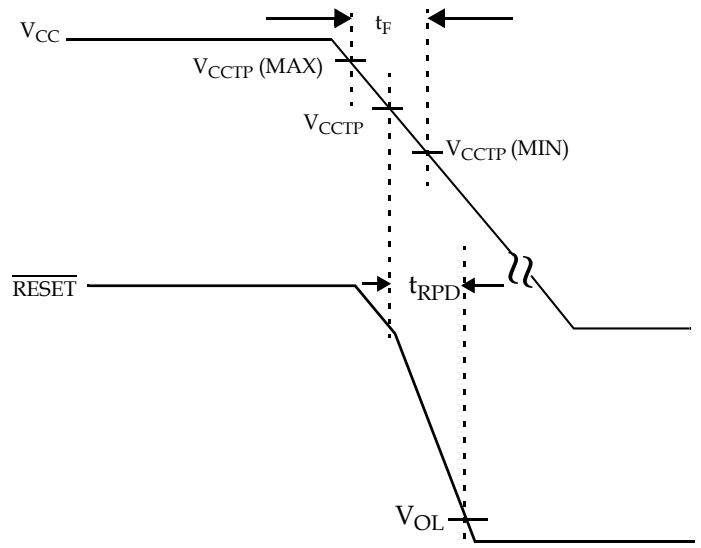


Figure 2: Timing Diagram: Power-Down

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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	μA
Operating Current	I_{CC}	$V_{CC} < 3.6V$, \overline{RESET} output open		6	15	μA
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	μs
V_{CC} Slew Rate ($V_{HTL} - V_{LTL}$)	t_F		300			μs
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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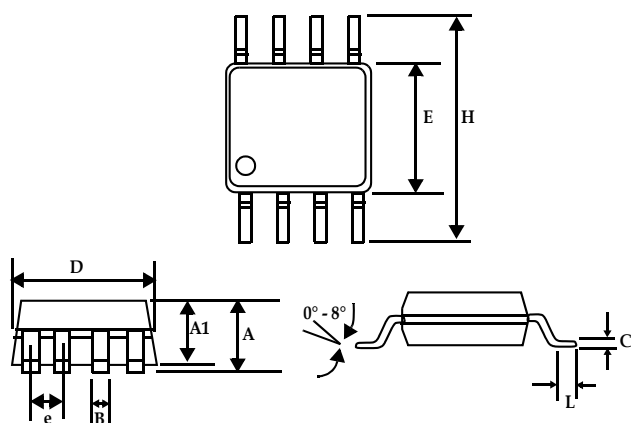


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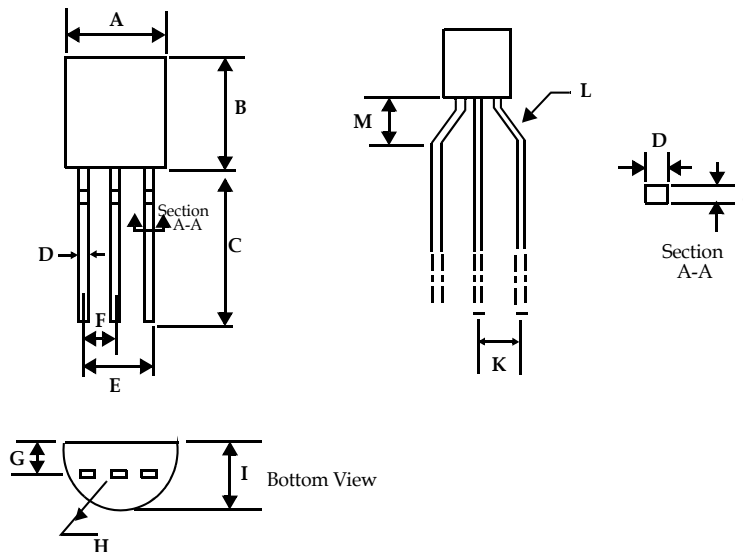
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Package Information

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							



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