Low Power, 5µP Reset, Active LOW, Open-Drain Output

General Description

The ASM1233D is a voltage supervisory device with low-power, 5V µP Reset, and an active LOW, open-drain output. Maximum supply current over temperature is a low 20µA.

The ASM1233D 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 350ms to allow the power supply and system microprocessor to stabilize.

The ASM1233D is designed with a open-drain output stage and operates over the extended industrial temperature range. Devices are available in compact surface mount SOT-223 packages and 3-lead TO-92 packages.

Other low power products in this family include the ASM1810/ 11/12/15/16/17 and ASM1233M.

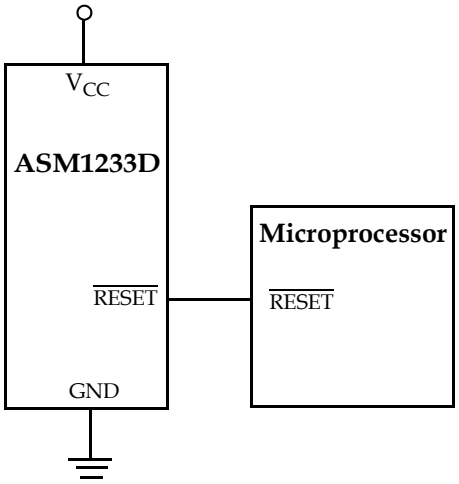
Key Features

- Low Supply Current
  - •20 µA maximum (5.5 V)
  - •15µA 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, 5kΩ internal pull-up
- Precision temperature-compensated voltage reference and comparator
- Eliminates external components
- Low-cost TO-92 package
- Compact surface mount SOT-223 package
- Operating temperature -40°C to +85°C

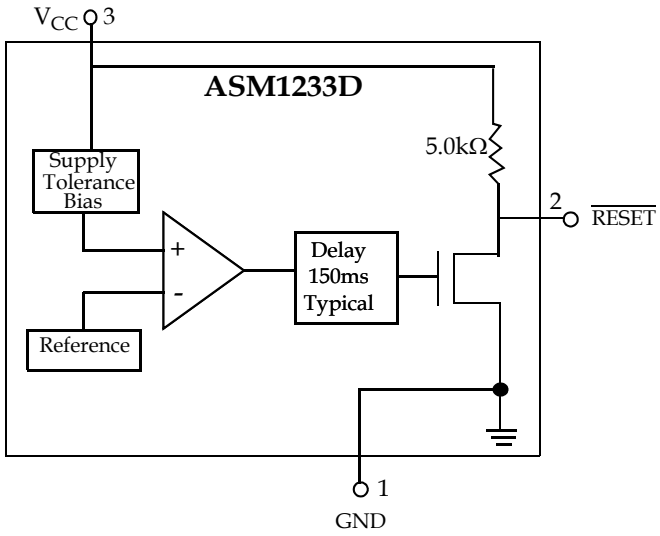
Applications

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

Typical Operating Circuit

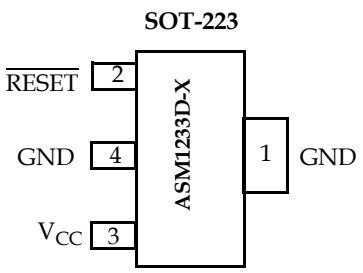


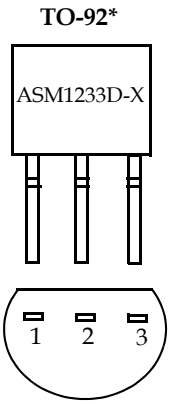
Block Diagram



rev 1.0

Pin Configuration





Pin Description

Pin #		Pin Name	Description
SOT-223	TO-92		
1	1	GND	Ground
2	2	$\overline{\text{RESET}}$	Active LOW reset output
3	3	V_{CC}	Power supply input
4	-	GND	Ground (SOT-223 only)

* See Ordering Information

Application Information

Operation - Power Monitor

The ASM1233D 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 $\overline{RESET}$ signal is asserted. On power-up, $\overline{RESET}$ is kept active (LOW) for approximatley 350ms after the power supply voltage has reached the selected tolerance. This allows the power supply and microprocessor to stablize before $\overline{RESET}$ is released.

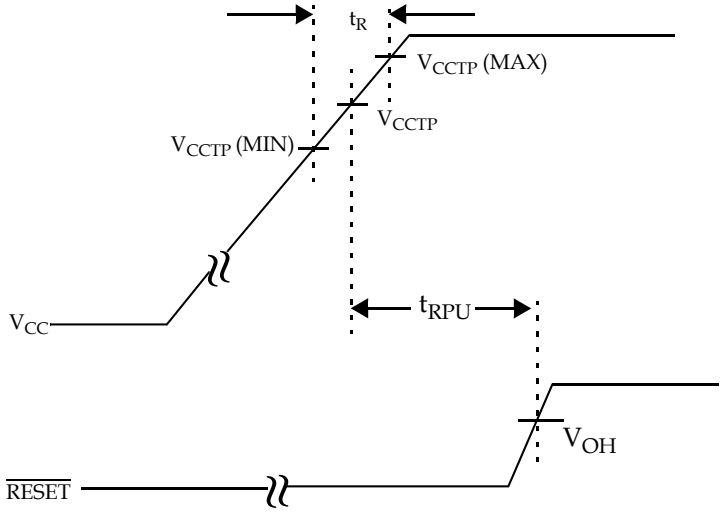


Figure 1: Timing Diagram: Power-Up

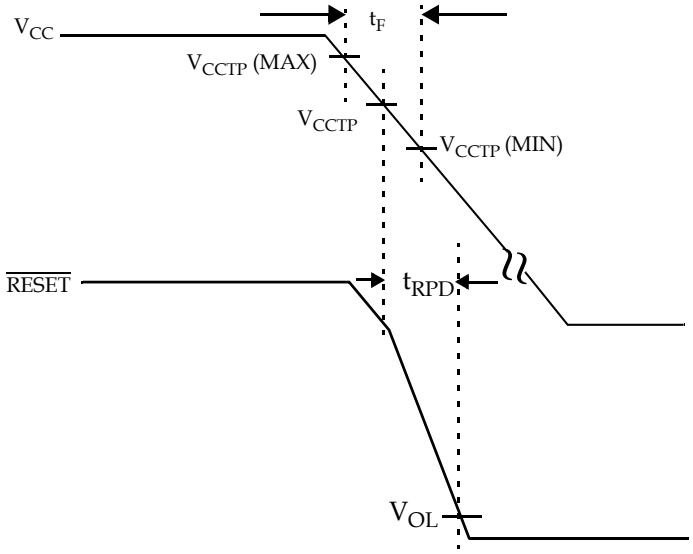


Figure 2: Timing Diagram: Power-Down

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
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°C to +85°C. All voltages are referenced to ground

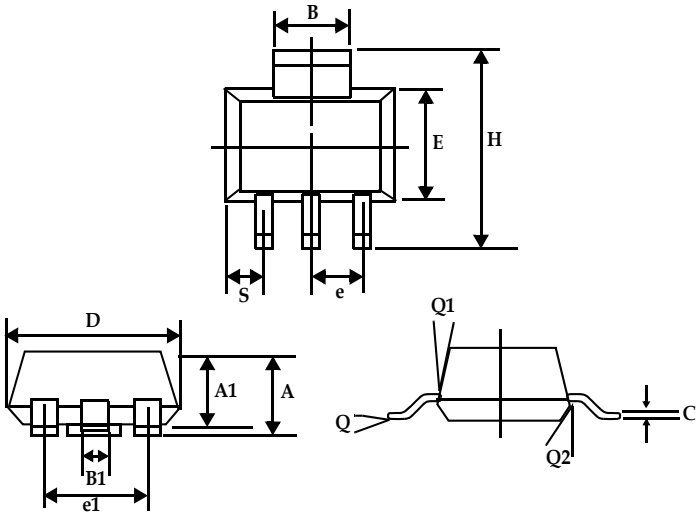
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage	V_{CC}		1.2		5.5	V
Output Voltage	V_{OH}	I_{OUT} < 500 µA	V_{CC} - 0.5V	V_{CC} - 0.1V		V
Output Current	I_{OL}	Output = 0.4V, V_{CC} >= 2.7V	+8			mA
Operating Current	I_{CC}	V_{CC} < 5.5V, $\overline{RESET}$ output open		8	20	µA
Operating Current	I_{CC}	V_{CC} < =3.6V, $\overline{RESET}$ output open		6	15	µA
V_{CC} Trip Point (ASM1233D-5)	V_{CCTP}		4.50	4.625	4.74	V
V_{CC} Trip Point (ASM1233D-10)	V_{CCTP}		4.25	4.375	4.49	V
V_{CC} Trip Point (ASM1233D-15)	V_{CCTP}		4.00	4.125	4.24	V
Internal Pull-up Resistor	R_P		3.5	5.0	7.5	kΩ
Output Capacitance	C_{OUT}				10	pF
RESET Active Time	t_{RESET}		250	350	450	ms
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	250	350	450	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

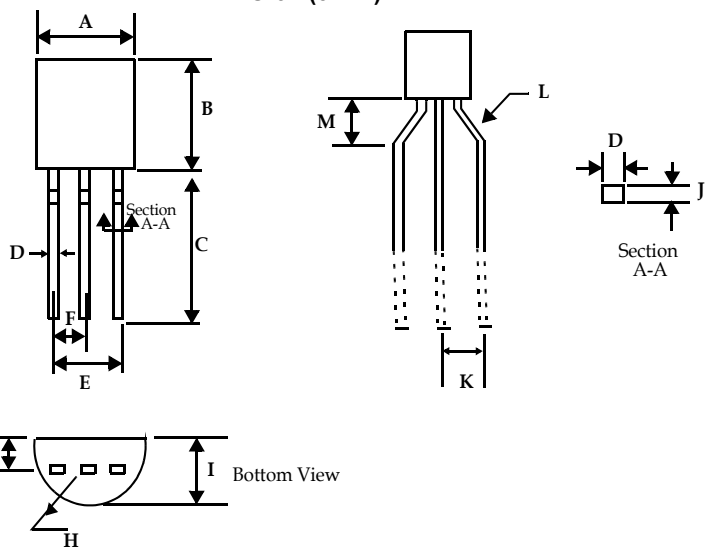
Part #	RESET Voltage (V)	RESET Time (ms)	Output Stage	RESET Polarity
ASM1810	4.620, 4.370, 4.120	150	Push-Pull	LOW
ASM1811	4.620, 4.350, 4.130	150	Open-Drain	LOW
ASM1812	4.620, 4.350, 4.130	150	Push-Pull	HIGH
ASM1815	3.060, 2.880, 2.550	150	Push-Pull	LOW
ASM1816	3.060, 2.880, 2.550	150	Open-Drain	LOW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

SOT-223 (4-Pin)



TO-92 (3 Pin)



	Dimensions in millimeters		Dimensions in Inches	
	Min	Max	Min	Max
Plastic SOT-223** (4-Pin)				
A	0.067	0.060	1.70	1.50
A1	0.004	0.0008	0.10	0.02
B	0.124	0.116	3.15	2.95
B1	0.033	0.026	0.85	0.65
C	0.014	0.010	0.35	0.25
D	0.264	0.248	6.70	6.30
e	0.0905 NOM		2.30 NOM	
e1	0.181 NOM		4.50 NOM	
E	0.146	0.130	3.70	3.30
h	0.287	0.264	7.30	6.70
s	0.041	0.033	1.05	0.85
Q	10 ° MAX		10 ° MAX	
Q1	16°	10°	16°	10°
Q2	16°	10°	16°	10°

	Dimensions in millimteres		Dimensions in inches	
	Min	Max	Min	Max
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	

Ordering Information

Device Summary								Package Marking			
Part Number	RESET Output Voltage (V)	RESET Tolerance (%)	RESET Time (ms)	Open-Drain Output Stage***	TO-92 Package*	SOT-223 Package**	RESET Polarity	A	B	C	D A=5% B=10% C=15%
ASM1233D-5	4.625	5	350	◆	◆		LOW				
ASM1233D-10	4.375	10	350	◆	◆		LOW				
ASM1233D-15	4.125	15	350	◆	◆		LOW				
ASM1233DZ-5	4.625	5	350	◆		◆	LOW	3	3	D	A
ASM1233DZ-10	4.375	10	350	◆		◆	LOW	3	3	D	B
ASM1233DZ-15	4.125	15	350	◆		◆	LOW	3	3	D	C

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

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