rev 1.0

Low Power, 3.3V/3.0V µP Reset Active LOW, Push-Pull Output

General Description

The ASM1815 is a voltage supervisory device with low-power, 3.3V/3.0V µP Reset, active LOW, Push-Pull output. Maximum supply current over temperature is a low 15µA.

The ASM1815 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 20%. 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 ASM1815 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/ 11/12/16/17, ASM1233D and ASM1233M.

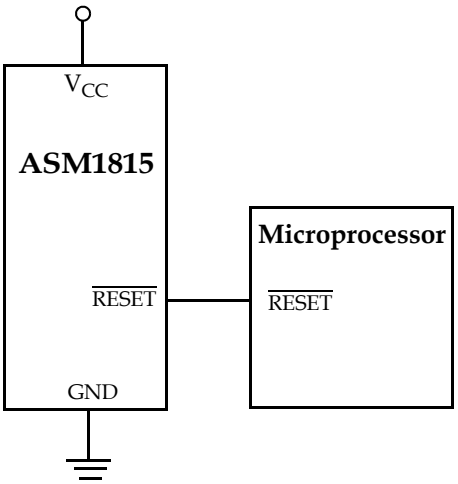
Key Features

- Low Supply Current
  - •20 µA maximum (5.5 V)
  - •15 µA maximum (3.6 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 package
- Compact surface mount SOT-23 package
- Push-Pull output for minimum current drain
- Operating temperature -40°C to +85°C

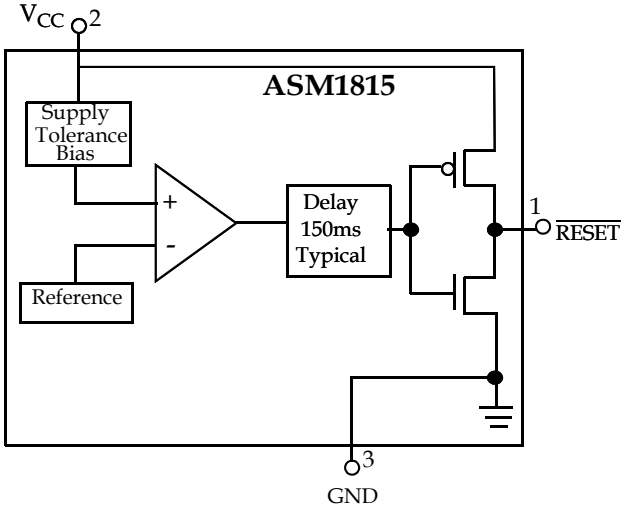
Applications

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

Typical Operating Circuit

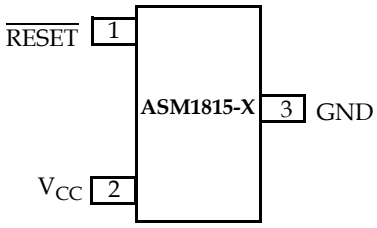


Block Diagram

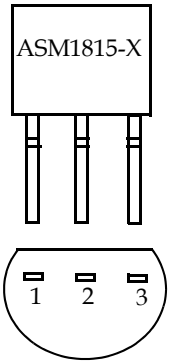


Pin Configuration

SOT-23



TO-92*



*See Ordering Information

Pin Description

Pin #	Pin Name	Description
1	$\overline{\text{RESET}}$	Active LOW reset output
2	V_{CC}	Power supply input
3	GND	Ground

Application Information

Operation - Power Monitor

The ASM1815 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 $\overline{RESET}$ signal is asserted. On power-up, $\overline{RESET}$ is kept active (LOW) for approximatley 150ms after the power supply voltage has reached the selected tolerance. This allows the power supply and microprocessor to stablize before $\overline{RESET}$ is released.

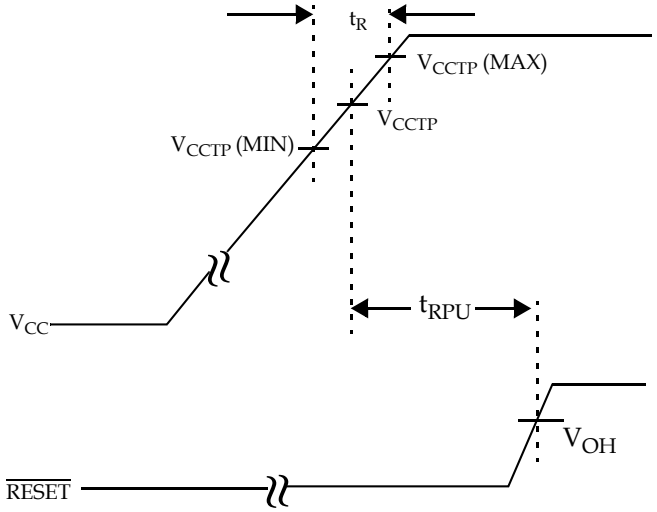


Figure 1: Timing Diagram: Power-Up

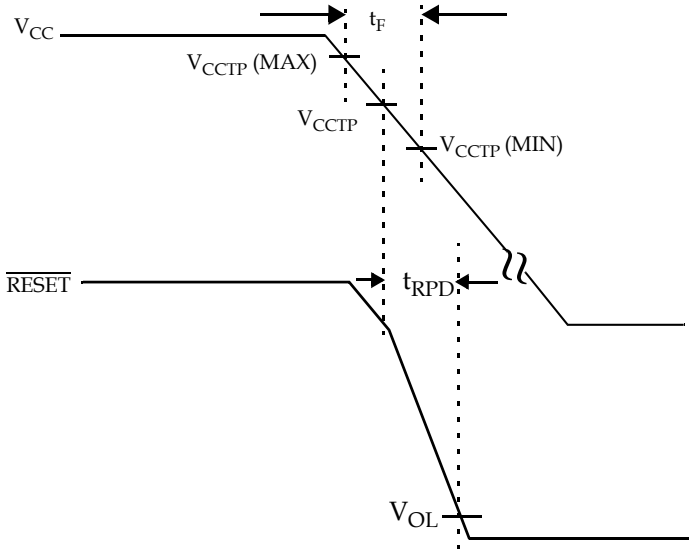


Figure 2: Timing Diagram: Power-Down

Output Conditions

The ASM1815 active LOW reset signal is valid as long as V_{CC} remains below 1.2V. The $\overline{RESET}$ output on the ASM1815 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 ($\overline{RESET}$) to Ground (see Figure 3). This configuration will give a valid value on the $\overline{RESET}$ 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.

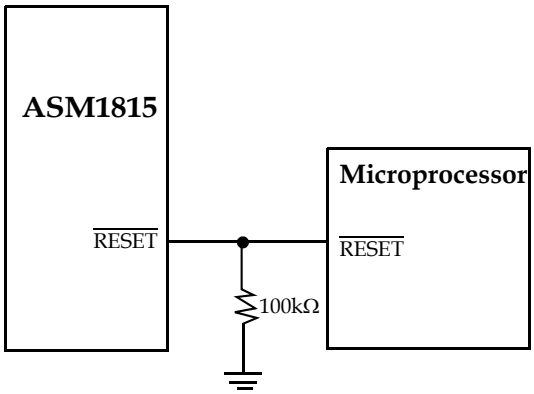


Figure 3: $\overline{RESET}$ Valid to 0V V_{CC}

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.			

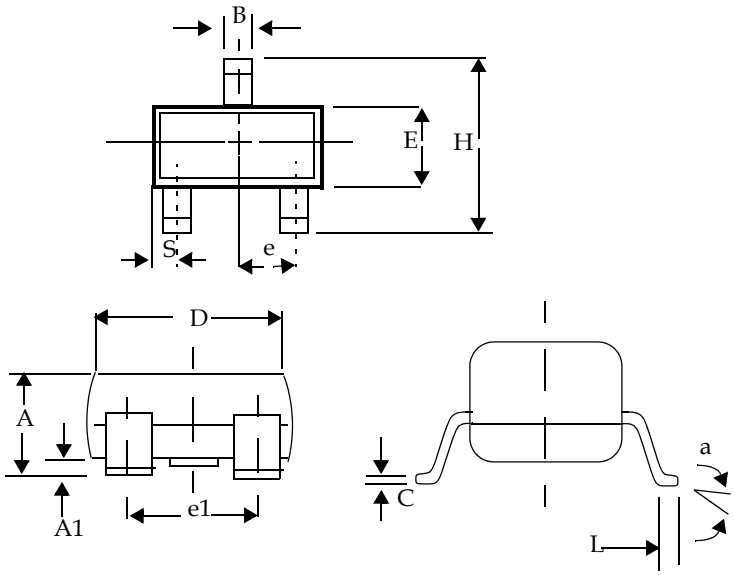
Electrical Characteristics

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_{OH}	Output = 2.4V, $V_{CC} \geq$ 2.7V		350		µA
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	µA
Operating Current	I_{CC}	$V_{CC} \leq$ 3.6V, $\overline{RESET}$ output open		6	15	µA
V_{CC} Trip Point (ASM1815-5)	V_{CCTP}		2.98	3.06	3.15	V
V_{CC} Trip Point (ASM1815-10)	V_{CCTP}		2.80	2.88	2.97	V
V_{CC} Trip Point (ASM1815-15)	V_{CCTP}		2.47	2.55	2.64	V
Output Capacitance	C_{OUT}				10	pF
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	100	150	250	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.						

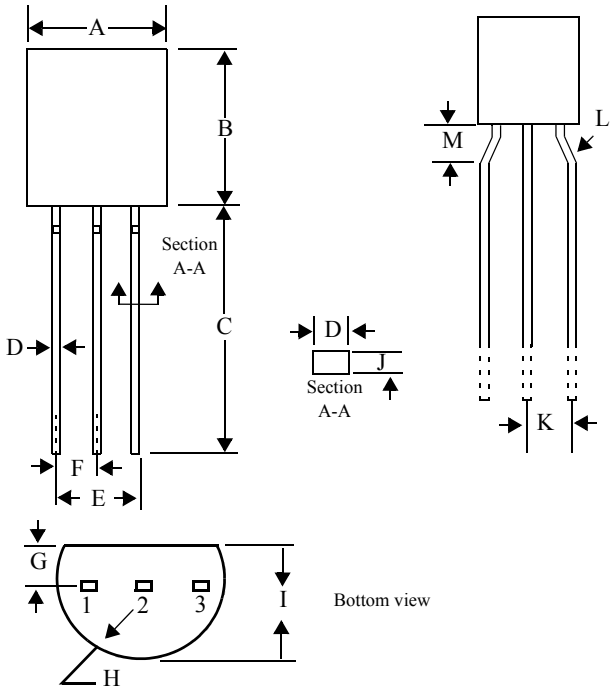
Package Dimension

Plastic SOT-23 (3-Pin)



	Inches		Millimeters	
	Min	Max	Min	Max
Plastic SOT-23 (3-Pin)				
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
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	0.060	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	45^0	60^0	45^0	60^0
M	0.118 Typical		3.00	

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

Ordering Information

Device Summary								Package Marking			
Part ** Number	RESET Output Voltage (V)	RESET Tolerance (%)	RESET Time (ms)	Push-Pull Output Stage	TO-92* Package	SOT-23 Package	RESET Polarity	A	B	C	D
ASM1815-5	3.06	5	150	◆	◆		LOW				
ASM1815-10	2.88	10	150	◆	◆		LOW				
ASM1815-20	2.55	20	150	◆	◆		LOW				
ASM1815R-5	3.06	5	150	◆		◆	LOW	E	A	X	X
ASM1815R-10	2.88	10	150	◆		◆	LOW	E	B	X	X
ASM1815R-20	2.55	20	150	◆		◆	LOW	E	D	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

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