rev 1.4

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 (at 3.6V).

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 TO-92 and compact surface mount SOT-23 packages.

Other low power products in this family include the ASM1810/ 11/12/16/17, ASM1233D and ASM1233M.

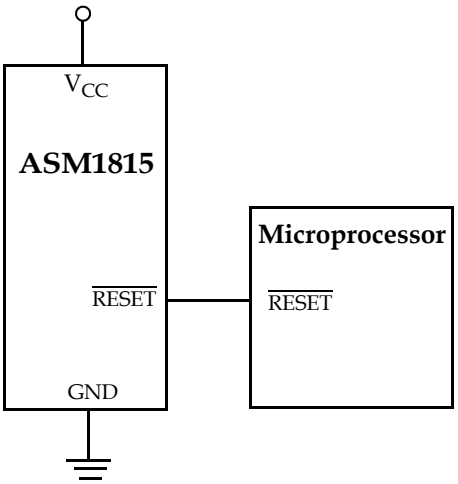
Key Features

- 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
- TO-92 and compact surface mount SOT-23 package
- Push-Pull output for minimum current drain
- Operating temperature -40°C to +85°C

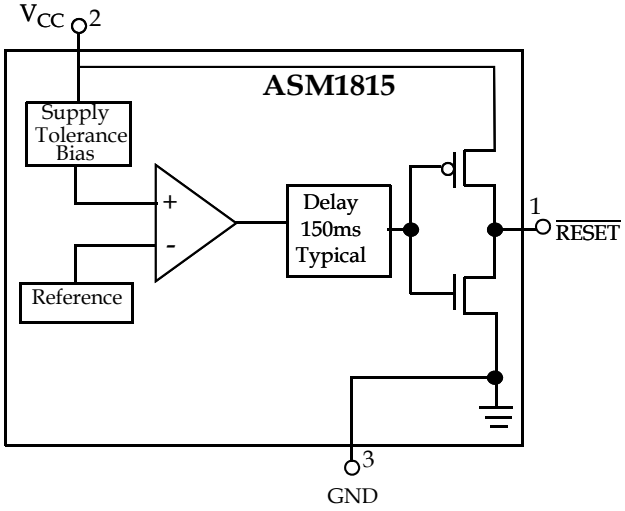
Applications

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

Typical Operating Circuit



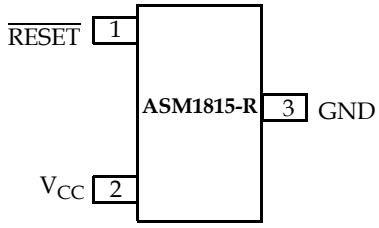
Block Diagram



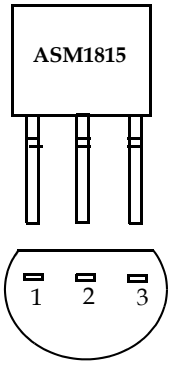
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Pin Configuration

SOT-23



TO-92



Pin Description

TO-92 Pin #	SOT-23 Pin #	Pin Name	Description
1	1	$\overline{\text{RESET}}$	Active LOW reset output
2	2	V_{CC}	Power supply input
3	3	GND	Ground

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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.

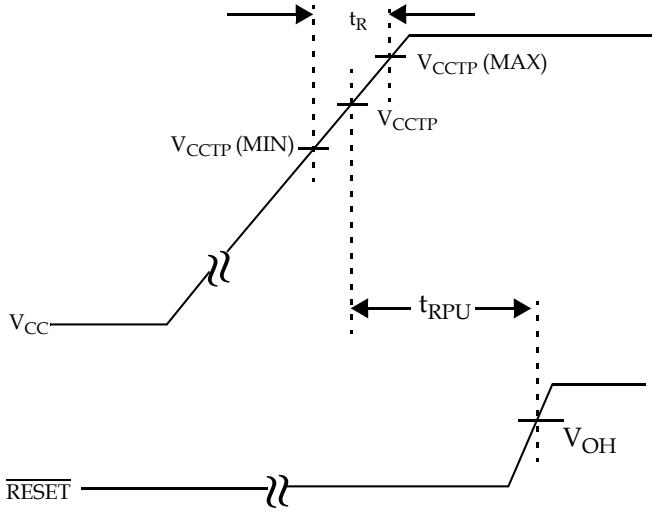


Figure 1: Timing Diagram: Power-Up

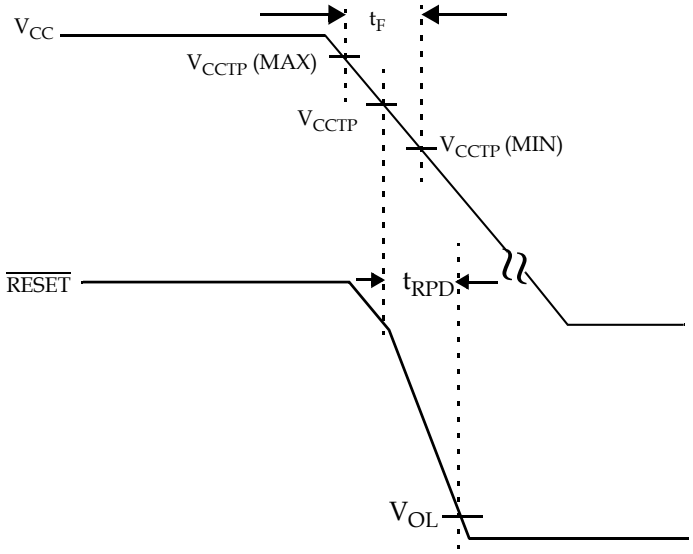


Figure 2: Timing Diagram: Power-Down

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 $\overline{RESET}$ is in the high state. A value of 100kΩ should be adequate to maintain a valid connection.

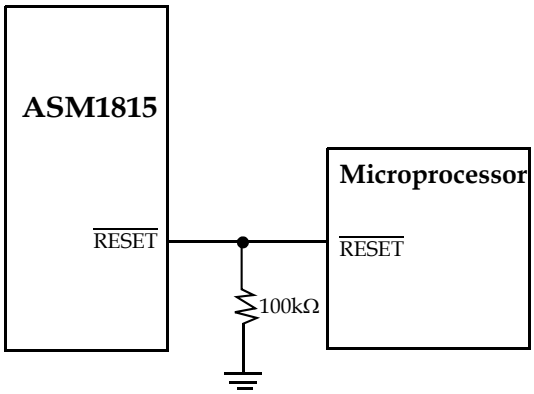


Figure 3: $\overline{RESET}$ Valid to 0V V_{CC}

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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
ESD rating HBM MM		 2 200	 KV V
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

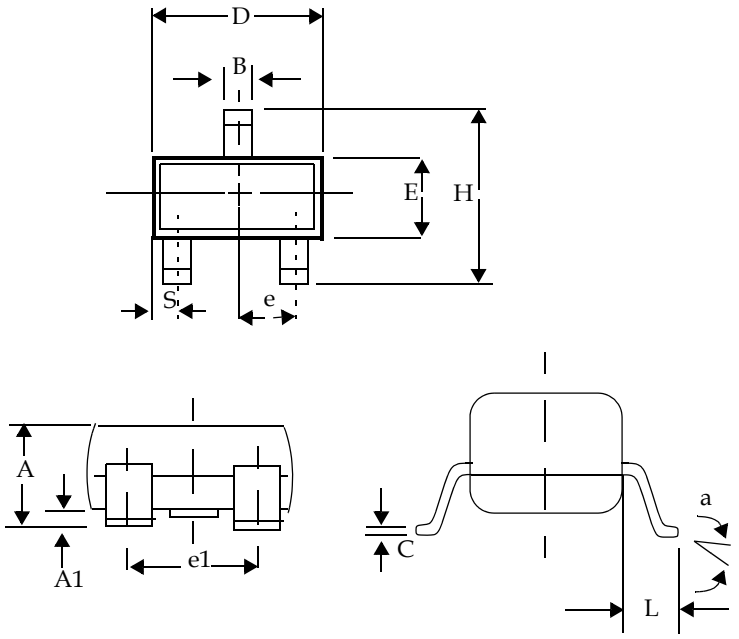
Unless otherwise noted, V_{CC}= 1.2V to 5.5V and specifications are over the operating temperature range of -40°C to +85°C. All voltages are referenced to ground

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 (ASM1815R-5)	V_{CCTP}		2.98	3.06	3.15	V
V_{CC} Trip Point (ASM1815R-10)	V_{CCTP}		2.80	2.88	2.97	V
V_{CC} Trip Point (ASM1815R-20)	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.						

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Package Dimension

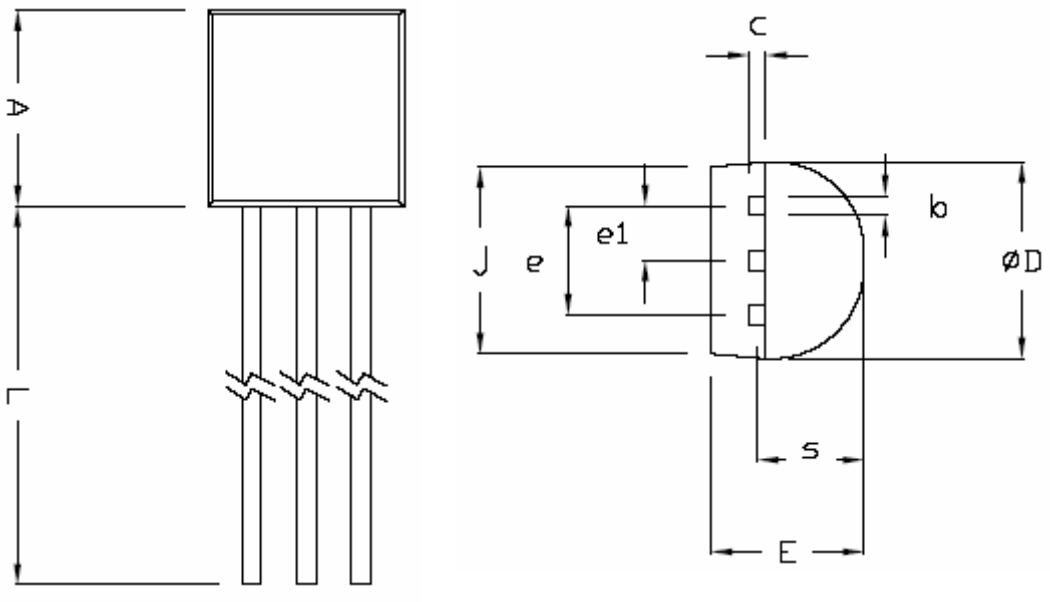
Plastic SOT-23 (3-Pin)



	Inches		Millimeters	
	Min	**Max**	**Min**	**Max**
Plastic SOT-23 (3-Pin)				
A	0.030	0.046	0.75	1.17
A1	0.002	0.006	0.05	0.15
B	0.012	0.020	0.30	0.50
C	0.003	0.008	0.08	0.20
D	0.110	0.120	2.80	3.04
E	0.047	0.055	1.20	1.40
e	0.037 BSC		0.95 BSC	
e1	0.075 BSC		1.9 BSC	
H	0.083	0.104	2.10	2.64
L	0.016	0.024	0.40	0.60
a	0^o	8^o	0^o	8^o
S	NA		NA	

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To-92 (3-Pin)



	Dimensions in Inches		Dimensions in Millimeters	
	Min	Max	Min	Max
TO-92				
A	0.175	0.185	4.445	4.699
b	0.016	0.020	0.406	0.508
C	0.014	0.016	0.356	0.406
ϕD	0.175	0.185	4.445	4.699
E	0.138	0.144	3.505	3.658
e	0.098	0.102	2.489	2.591
e1	0.045	0.055	1.143	1.397
j	0.168	0.174	4.269	4.420
L	0.500	0.585	12.7	14.86
s	0.095	0.099	2.413	2.515

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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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Ordering Information

Device Summary							
Part ** Number	**RESET Output Voltage (V)**	**RESET Tolerance (%)**	**RESET Time (ms)**	**Push-Pull Output Stage**	**SOT-23 Package**	**RESET Polarity**	**Package Marking**
TIN - LEAD DEVICES							
ASM1815R-5	3.06	5	150	◆	◆	LOW	RJLL
ASM1815R-10	2.88	10	150	◆	◆	LOW	RKLL
ASM1815R-20	2.55	20	150	◆	◆	LOW	RLLL
LEAD FREE DEVICES							
ASM1815R-5F	3.06	5	150	◆	◆	LOW	KJLL
ASM1815R-10F	2.88	10	150	◆	◆	LOW	KKLL
ASM1815R-20F	2.55	20	150	◆	◆	LOW	KLLL
Part ** Number	**RESET Output Voltage (V)**	**RESET Tolerance (%)**	**RESET Time (ms)**	**Push-Pull Output Stage**	**TO-92 Package**	**RESET Polarity**	**Package Marking**
TIN - LEAD DEVICES							
ASM1815-5	3.06	5	150	◆	◆	LOW	ASM1815-5
ASM1815-10	2.88	10	150	◆	◆	LOW	ASM1815-10
ASM1815-20	2.55	20	150	◆	◆	LOW	ASM1815-20
LEAD FREE DEVICES							
ASM1815-5F	3.06	5	150	◆	◆	LOW	ASM1815-5F
ASM1815-10F	2.88	10	150	◆	◆	LOW	ASM1815-10F
ASM1815-20F	2.55	20	150	◆	◆	LOW	ASM1815-20F

* *Add /T to Part Number for Tape and Reel (i.e ASM18xx-x/T)
LL- Lot Code

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