



February 2005

ASM1816

rev 1.4

Low Power 3.3V/3.0V μ P Reset, Active LOW, Open-Drain Output

General Description

The ASM1816 is a voltage supervisory device with low-power, 3.3V/3V μ P Reset, active LOW, open-drain output. Maximum supply current over temperature is a low 15 μ A (at 3.6V).

The ASM1816 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 ASM1816 is designed with a open-drain 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 ASM1810/11/12/15/17, ASM1233D and ASM1233M.

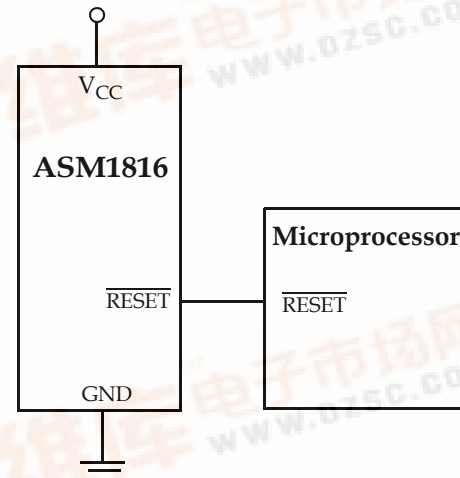
Key Features

- Low Supply Current
 - 20 μ A maximum (5.5 V)
 - 15 μ A maximum (3.6 V)
- Automatically restarts a microprocessor after power failure
- 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
- Operating temperature -40°C to +85°C

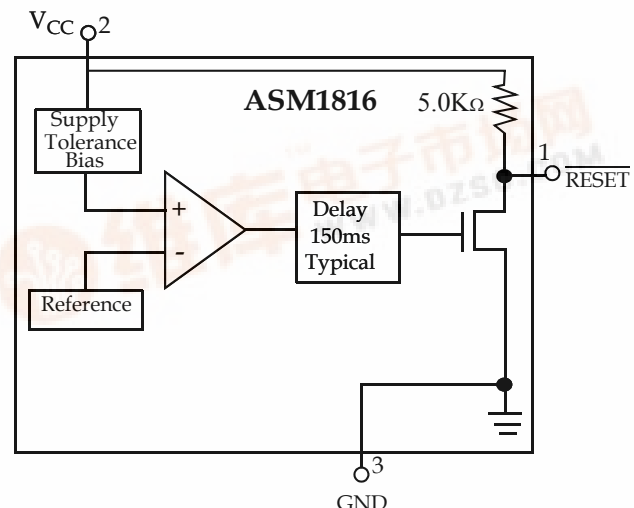
Applications

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

Typical Application



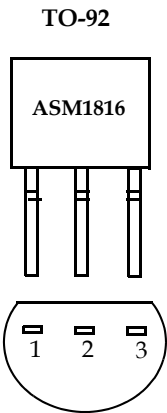
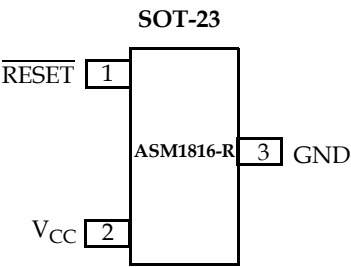
Block Diagram





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Pin Configuration



Pin Description

TO-92	SOT-23	Pin Name	Description
Pin #	Pin #		
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 ASM1816 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 $\overline{\text{RESET}}$ signal is asserted. On power-up, $\overline{\text{RESET}}$ is kept active (LOW) for approximately 150ms 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.

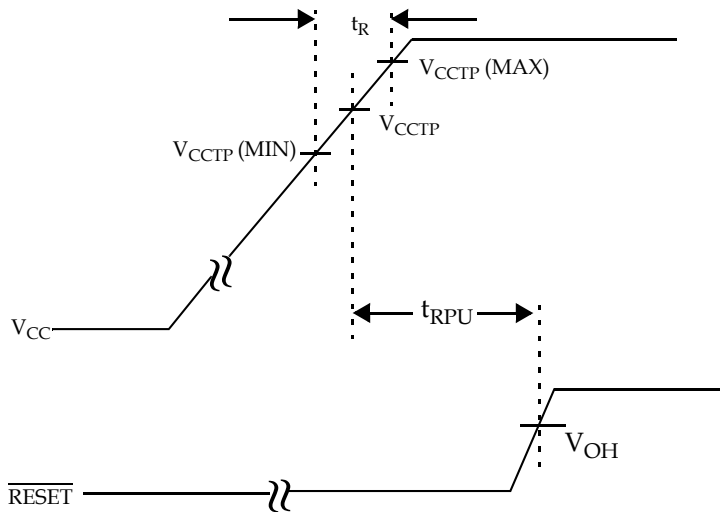


Figure 1: Timing Diagram: Power-Up

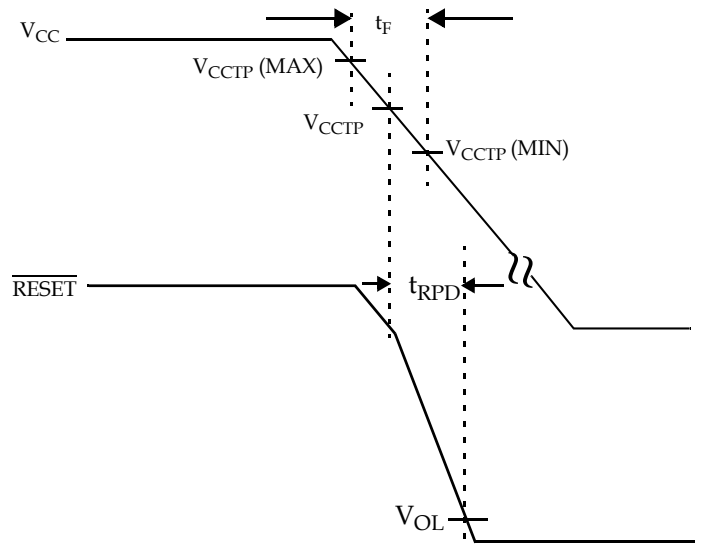


Figure 2: Timing Diagram: Power-Down



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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
ESD rating			
HBM		2	KV
MM		200	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 $-40^{\circ}C$ 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 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 (ASM1816R-5)	V_{CCTP}		2.98	3.06	3.15	V
V_{CC} Trip Point (ASM1816R-10)	V_{CCTP}		2.80	2.88	2.97	V
V_{CC} Trip Point (ASM1816R-20)	V_{CCTP}		2.47	2.55	2.64	V
Internal Pull-up Resistor	R_P		3.5	5.5	7.5	$k\Omega$
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}	$t_r = 5\mu s$	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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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

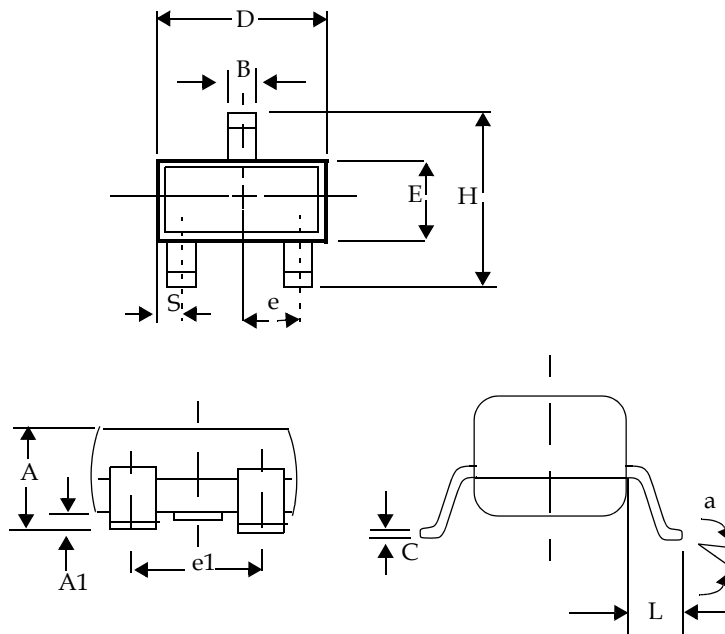
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Package Dimension

Plastic SOT-23 (3-Pin)

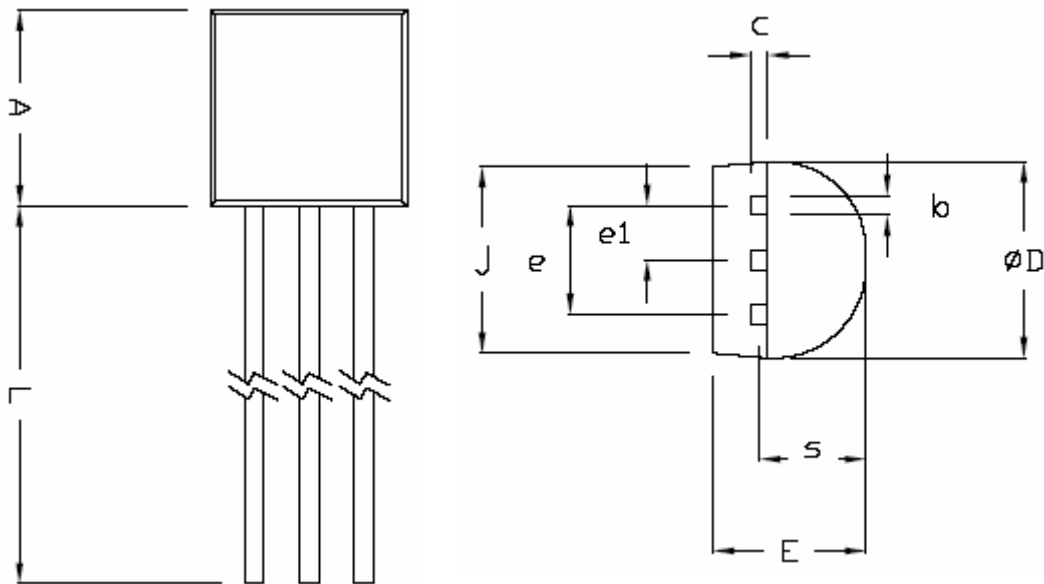


	Inches		Millimeters	
	Min	Max	Min	Max
Plastic SOT-23 (3-Pin)				
A	0.030	0.046	0.75	1.17
A1	0.002	0.006	0.05	0.15
B	0.012	0.020	0.30	0.50
C	0.003	0.008	0.08	0.20
D	0.110	0.120	2.80	3.04
E	0.047	0.055	1.20	1.40
e	0.037 BSC		0.95 BSC	
e1	0.075 BSC		1.9 BSC	
H	0.083	0.104	2.10	2.64
L	0.016	0.024	0.40	0.60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

Device Summary							
Part *** Number	RESET Output Voltage (V)	RESET Tolerance (%)	RESET Time (ms)	Open-Drain ** Output Stage	SOT-23 Package	RESET Polarity	Package Marking
TIN - LEAD DEVICES							
ASM1816R-5	3.06	5	150	◆	◆	LOW	RMLL
ASM1816R-10	2.88	10	150	◆	◆	LOW	RNLL
ASM1816R-20	2.55	20	150	◆	◆	LOW	ROLL
LEAD FREE DEVICES							
ASM1816R-5F	3.06	5	150	◆	◆	LOW	KMLL
ASM1816R-10F	2.88	10	150	◆	◆	LOW	KNLL
ASM1816R-20F	2.55	20	150	◆	◆	LOW	KOLL
Part *** Number	RESET Output Voltage (V)	RESET Tolerance (%)	RESET Time (ms)	Open-Drain ** Output Stage	TO-92 Package	RESET Polarity	Package Marking
TIN - LEAD DEVICES							
ASM1816-5	3.06	5	150	◆	◆	LOW	ASM1816-5
ASM1816-10	2.88	10	150	◆	◆	LOW	ASM1816-10
ASM1816-20	2.55	20	150	◆	◆	LOW	ASM1816-20
LEAD FREE DEVICES							
ASM1816-5F	3.06	5	150	◆	◆	LOW	ASM1816-5F
ASM1816-10F	2.88	10	150	◆	◆	LOW	ASM1816-10F
ASM1816-20F	2.55	20	150	◆	◆	LOW	ASM1816-20F
** Internal 5.5kΩ resistor pull-up ** *Add /T to Part Number for Tape and Reel (i.e ASM18xx-x/T) LL - Lot Code							



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