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

General Description

The ASM1816 is a voltage supervisory device with low-power, 3.3V/3V µP Reset, active LOW, open-drain output. Maximum supply current over temperature is a low 15µA (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.

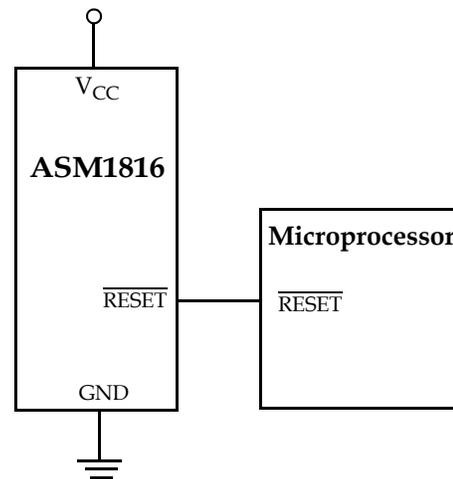Other low power products in this family include the ASM1810/11/12/15/17, ASM1233D and ASM1233M.

Applications

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

Typical Application

Key Features

- Low Supply Current
  - •20 µA maximum (5.5 V)
  - •15µA maximum (3.6 V)
- Automatically restarts a microprocessor after power failure
- 150ms reset delay after V_{CC} returns to an in-tolerance con- dition
- Active LOW power-up reset
- Precision temperature-compensated voltage reference and comparator
- Eliminates external components
- TO-92 and compact surface mount SOT-23 package
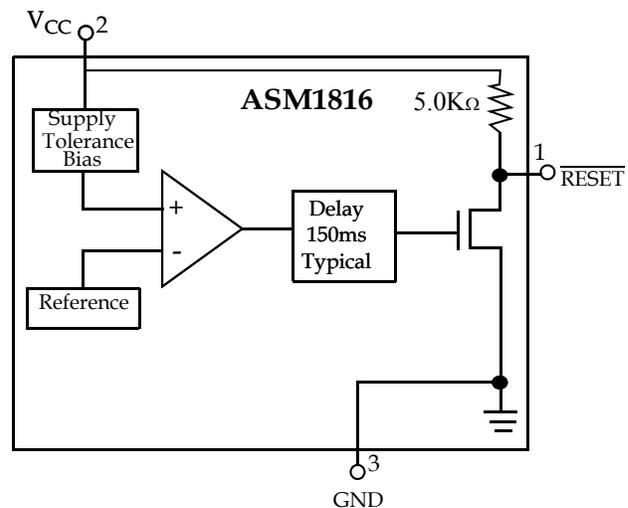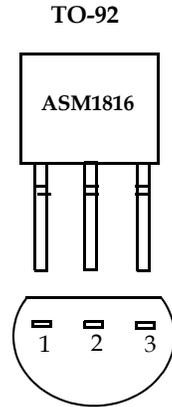- Operating temperature -40°C to +85°C

Block Diagram

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Pin Configuration
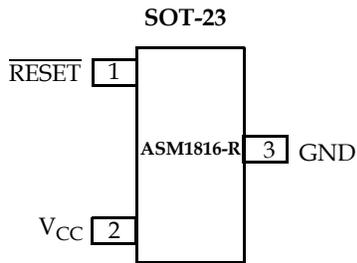
SOT-23

TO-92

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 $\overline{RESET}$ 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.

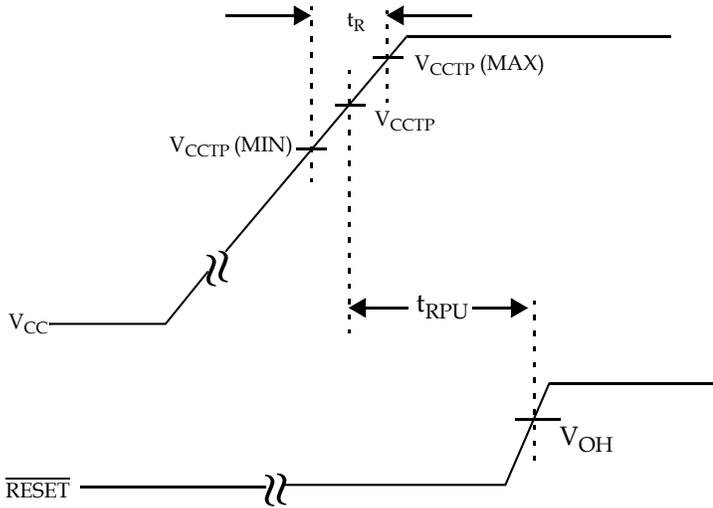Figure 2: Timing Diagram: Power-Down

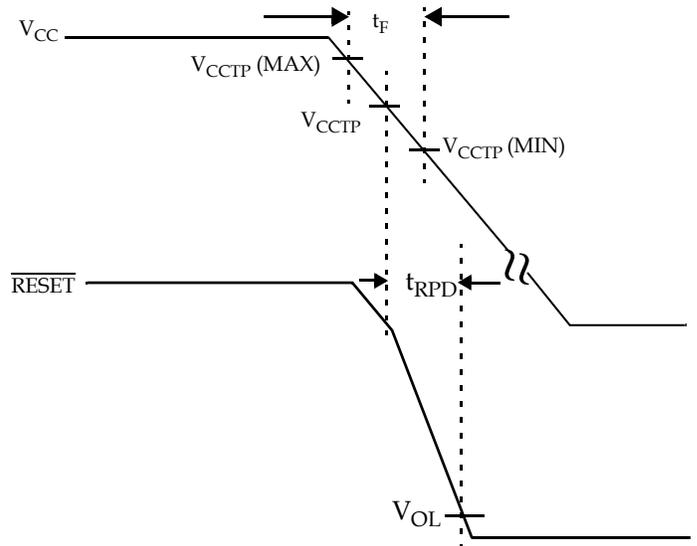Figure 1: Timing Diagram: Power-Up

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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 Current	I$_{OL}$	Output = 0.4V, V$_{CC}$ ≥ 2.7V	+10			mA
Operating Current	I$_{CC}$	V$_{CC}$ < 5.5V, $\overline{RESET}$ output open		8	20	µA
Operating Current	I$_{CC}$	V$_{CC}$ ≤ 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	kΩ
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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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)
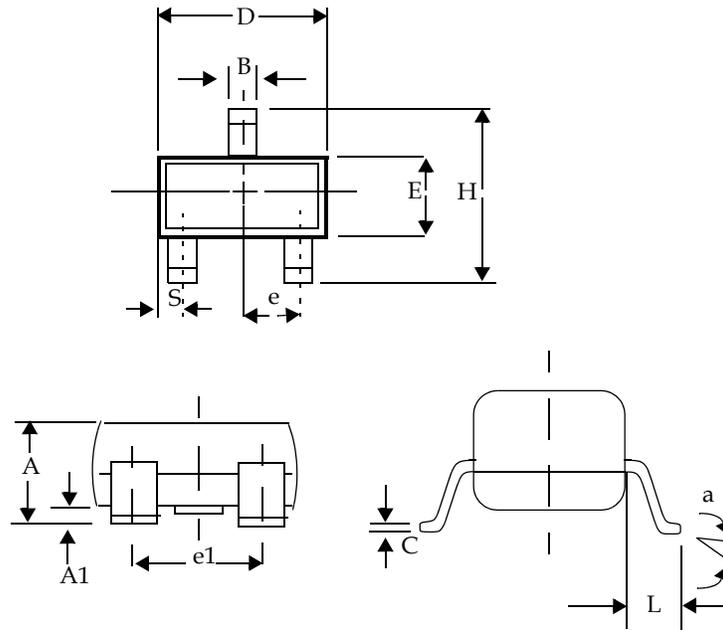
	Inches		Millimeters	
	Min	**Max**	**Min**	**Max**
Plastic SOT-23 (3-Pin)				
A	0.030	0.046	0.75	1.17
A1	0.002	0.006	0.05	0.15
B	0.012	0.020	0.30	0.50
C	0.003	0.008	0.08	0.20
D	0.110	0.120	2.80	3.04
E	0.047	0.055	1.20	1.40
e	0.037 BSC		0.95 BSC	
e1	0.075 BSC		1.9 BSC	
H	0.083	0.104	2.10	2.64
L	0.016	0.024	0.40	0.60
a	$0°$	$8°$	$0°$	$8°$
S	NA		NA	

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To-92 (3-Pin)
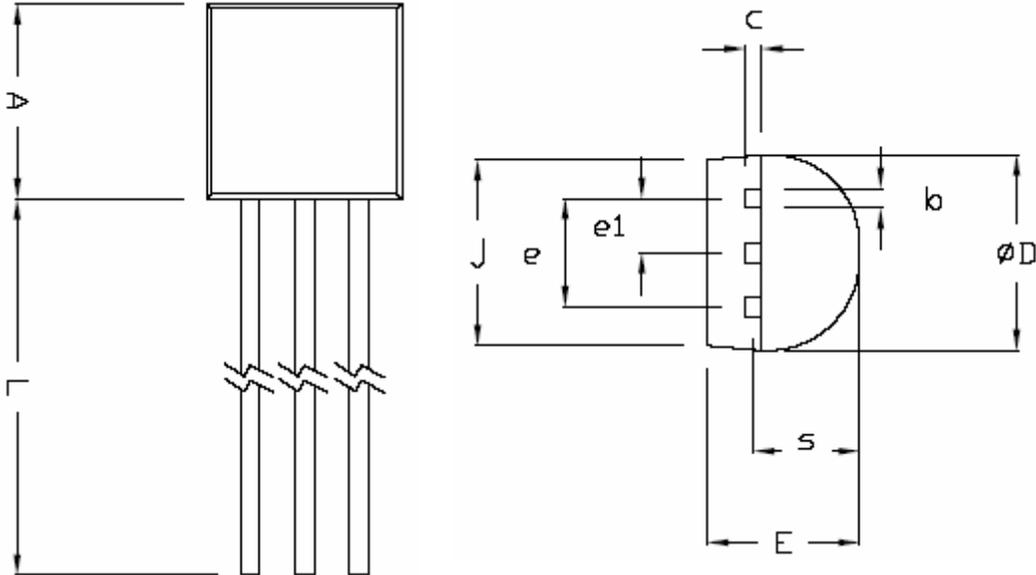
	Dimensions in Inches		Dimensions in Millimeters	
	Min	**Max**	**Min**	**Max**
TO-92				
A	0.175	0.185	4.445	4.699
b	0.016	0.020	0.406	0.508
C	0.014	0.016	0.356	0.406
φD	0.175	0.185	4.445	4.699
E	0.138	0.144	3.505	3.658
e	0.098	0.102	2.489	2.591
e1	0.045	0.055	1.143	1.397
j	0.168	0.174	4.269	4.420
L	0.500	0.585	12.7	14.86
s	0.095	0.099	2.413	2.515

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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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