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

Description

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

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 ($V_{\rm CC}$) level. Tolerance level options are 5%, 10%, 15% 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 $V_{\rm CC}$ returns to an in–tolerance condition, the reset signal remains active for 150 ms 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.

Features

- Low Supply Current 20 μA Maximum (5.5 V) 15 μA Maximum (3.6 V)
- Automatically Restarts a Microprocessor after Power Failure
- 150 ms 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



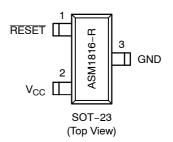
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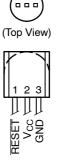
http://onsemi.com





PIN CONFIGURATIONS





TO-92 ASM1816

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 8 of this data sheet.

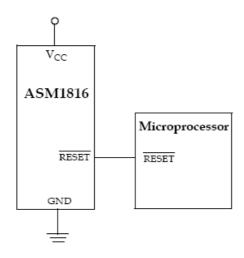


Figure 1. Typical Application

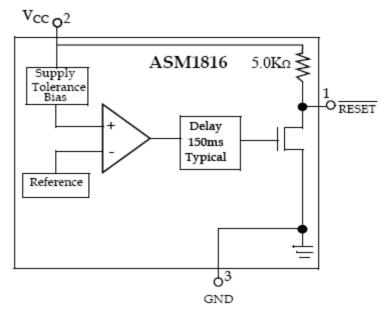


Figure 2. Block Diagram

Table 1. PIN DESCRIPTION

TO-92	SOT-23		
Pin #	Pin #	Pin Name	Description
1	1	RESET	Active LOW reset output
2	2	V _{CC}	Power supply input
3	3	GND	Ground

Table 2. ABSOLUTE MAXIMUM RATINGS

P	arameter	Min	Max	Unit
Voltage on V _{CC} (Note 1)	-0.5	7	V
Voltage on RESE	T (Note 1)	-0.5	V _{CC} + 0.5	V
Operating Tempe	erature Range	-40	+85	°C
Soldering Tempe	rature (for 10 sec)		+260	°C
Storage Tempera	ature	-55	+125	°C
ESD rating	НВМ	2		KV
	MM		200	V

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 3. DC ELECTRICAL CHARACTERISTICS (Unless otherwise noted, $V_{CC} = 1.2 \text{ V}$ to 5.5 V and specifications are over the operating temperature range of -40°C to $+85^{\circ}\text{C}$. All voltages are referenced to ground.)

Parameter	Symbol	Conditions	Min	Тур	Max	Unit
Supply Voltage	V _{CC}		1.2		5.5	V
Output Current	l _{OL}	Output = 0.4 V, V _{CC} > 2.7 V	10			mA
Operating Current	I _{CC}	V _{CC} < 5.5 V, RESET output open		8	20	μΑ
		V _{CC} ≤ 3.6 V, RESET output open		6	15	
V _{CC} Trip Point	V _{CCTP}	ASM1816R-5	2.98	3.06	3.15	V
		ASM1816R-10	2.80	2.88	2.97	
		ASM1816R-15	2.635	2.72	2.805	
		ASM1816R-20	2.47	2.55	2.64	
Internal Pull-up Resistor	R_P		3.5	5.5	7.5	ΚΩ
Output Capacitance	C _{OUT}				10	pF
V _{CC} Detect to RESET Low	t _{RPD}			2	5	μs
V _{CC} Slew Rate (V _{CCTP} (MAX) to V _{CCTP} (MIN)	t _F (Note 2)		300			μs
V _{CC} Slew Rate (V _{CCTP} (MIN) to V _{CCTP} (MAX)	t _R		0			ns
V _{CC} Detect to RESET High	t _{RPU}	$t_r = 5 \mu s$	100	150	250	ms

^{2.} The t_F value is for reference in defining values for t_{RPD} and should not be considered for proper operation or use.

^{1.} Voltages are measured with respect to ground.

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 $V_{\rm CC}$ voltage is

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

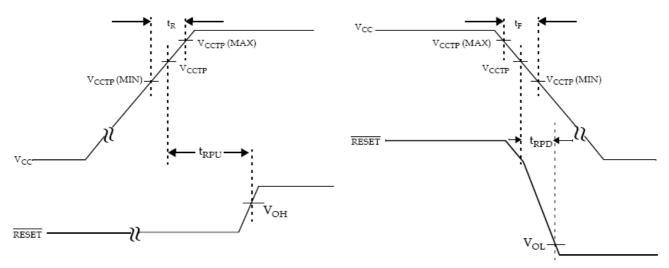


Figure 3. Timing Diagram: Power-Up

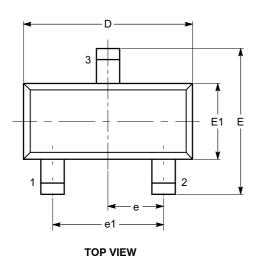
Figure 4. Timing Diagram: Power-Down

Table 4. FAMILY SELECTION GUIDE

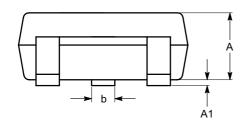
Part #	RESET Voltage (V)	RESET Time (ms)	Output Stage	RESET Polarity
ASM1810	4.620, 4.370, 4.120	150	Push-Pull	LOW
ASM1811	4.620, 4.350, 4.130	150	Open-Drain	LOW
ASM1812	4.620, 4.350, 4.130	150	Push-Pull	HIGH
ASM1815	3.060, 2.880, 2.550	150	Push-Pull	LOW
ASM1816	3.060, 2.720, 2.880, 2.550	150	Open-Drain	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

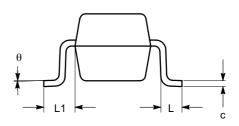
PACKAGE DIMENSIONS

SOT-23, 3 Lead CASE 527AG-01 ISSUE O



SYMBOL	MIN	NOM	MAX				
Α	0.89		1.12				
A1	0.013		0.10				
b	0.37		0.50				
С	0.085		0.18				
D	2.80		3.04				
Е	2.10		2.64				
E1	1.20		1.40				
е		0.95 BSC					
e1		1.90 BSC					
L		0.40 REF					
L1		0.54 REF					
θ	0°		8°				





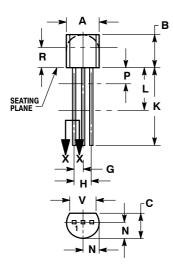
SIDE VIEW

Notes:

- (1) All dimensions are in millimeters. Angles in degrees.(2) Complies with JEDEC TO-236.

PACKAGE DIMENSIONS

TO-92 (TO-226) CASE 29-11 **ISSUE AM**



STRAIGHT LEAD **BULK PACK**



- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
 4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

	INC	HES	MILLIN	IETERS
DIM	MIN	MAX	MIN	MAX
Α	0.175	0.205	4.45	5.20
В	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
G	0.045	0.055	1.15	1.39
Н	0.095	0.105	2.42	2.66
7	0.015	0.020	0.39	0.50
K	0.500		12.70	
L	0.250		6.35	
N	0.080	0.105	2.04	2.66
P		0.100		2.54
R	0.115		2.93	
٧	0 135		3 43	

Table 5.

			•			
RESET Output Voltage	RESET Tolerance	RESET Time	Open Drain Output (Note 4)	RESET Polarity	Package	Package Marking (Note 5)
3.06	5%	350 ms	•	LOW	3L TO-92	ASM1233D-L-5
2.88	10%	350 ms	•	LOW	3L TO-92	ASM1233D-L-10
2.72	15%	350 ms	•	LOW	3L TO-92	ASM1233D-L-15
3.06	5%	350 ms	•	LOW	4L SOT-223	RVLL
2.88	10%	350 ms	•	LOW	4L SOT-223	RWLL
2.72	15%	350 ms	•	LOW	4L SOT-223	RXLL
4.625	5%	350 ms	•	LOW	3L TO-92	ASM1233D-5
4.375	10%	350 ms	•	LOW	3L TO-92	ASM1233D-10
4.125	15%	350 ms	•	LOW	3L TO-92	ASM1233D-15
4.625	5%	350 ms	•	LOW	4L SOT-223	RSLL
4.375	10%	350 ms	•	LOW	4L SOT-223	RTLL
4.125	15%	350 ms	•	LOW	4L SOT-223	RULL
4.625	5%	350 ms	•	LOW	3L TO-92	ASM1233M-55
4.375	10%	350 ms	•	LOW	3L TO-92	ASM1233M-5
2.72	15%	350 ms	•	LOW	3L TO-92	ASM1233M-3
4.625	5%	350 ms	•	LOW	8L SOIC	ASM1233MS-55
4.38	10%	350 ms	•	LOW	8L SOIC	ASM1233MS-5
2.72	15%	350 ms	•	LOW	8L SOIC	ASM1233MS-3
	•					
3.06	5%	350 ms	+	LOW	3L TO-92	ASM1233D-L-5F
2.88	10%	350 ms	•	LOW	3L TO-92	ASM1233D-L-10F
2.72	15%	350 ms	•	LOW	3L TO-92	ASM1233D-L-15F
3.06	5%	350 ms	•	LOW	4L SOT-223	KVLL
2.88	10%	350 ms	•	LOW	4L SOT-223	KWLL
2.72	15%	350 ms	•	LOW	4L SOT-223	KXLL
4.625	5%	350 ms	•	LOW	3L TO-92	ASM1233D-5F
4.375	10%	350 ms	•	LOW	3L TO-92	ASM1233D-10F
4.125	15%	350 ms	+	LOW	3L TO-92	ASM1233D-15F
4.625	5%	350 ms	•	LOW	4L SOT-223	KSLL
4.375	10%	350 ms	•	LOW	4L SOT-223	KTLL
4.125	15%	350 ms	•	LOW	4L SOT-223	KULL
4.375	5%	350 ms	+	LOW	3L TO-92	ASM1233M-5F
4.625	10%	350 ms	•	LOW	3L TO-92	ASM1233M-55F
2.72	15%	350 ms	•	LOW	3L TO-92	ASM1233M-3F
4.38	5%	350 ms	•	LOW	8L SOIC	ASM1233MS-5F
4.625	10%	350 ms	+	LOW	8L SOIC	ASM1233MS-55F
2.72	15%	350 ms	+	LOW	8L SOIC	ASM1233MS-3F
	3.06 2.88 2.72 3.06 2.88 2.72 4.625 4.375 4.125 4.625 4.375 2.72 4.625 4.38 2.72 3.06 2.88 2.72 3.06 2.88 2.72 4.625 4.375 4.125 4.625 4.375 4.125 4.625 4.375 4.125 4.625 4.375 4.125 4.625 4.375 4.125 4.625 4.375 4.125 4.375 4.625 4.375 4.125 4.375 4.625 4.375 4.125 4.375 4.625 4.375 4.625 4.375 4.625	Output Voltage RESET Tolerance 3.06 5% 2.88 10% 2.72 15% 3.06 5% 2.88 10% 2.72 15% 4.625 5% 4.375 10% 4.125 15% 4.625 5% 4.375 10% 4.125 15% 4.625 5% 4.375 10% 2.72 15% 4.625 5% 4.38 10% 2.72 15% 3.06 5% 2.88 10% 2.72 15% 4.625 5% 4.375 10% 4.125 15% 4.625 5% 4.375 10% 4.125 15% 4.375 10% 4.125 15% 4.375 10% 4.125 15% 4.375 </td <td>Output Voltage RESET Tolerance RESET Time 3.06 5% 350 ms 2.88 10% 350 ms 2.72 15% 350 ms 3.06 5% 350 ms 2.88 10% 350 ms 2.72 15% 350 ms 4.625 5% 350 ms 4.375 10% 350 ms 4.38 10% 350 ms 2.72 15% 350 ms 2.72 15% 350 ms 2.88 10% 350 ms 2.72 15% 350 ms 2.72 15% 350 ms 2.72 15% 350 ms 4.625</td> <td>Output Voltage RESET Tolerance RESET Time Output (Note 4) 3.06 5% 350 ms • 2.88 10% 350 ms • 2.72 15% 350 ms • 3.06 5% 350 ms • 2.88 10% 350 ms • 2.72 15% 350 ms • 4.625 5% 350 ms • 4.375 10% 350 ms • 4.625 5% 350 ms • 4.375 10% 350 ms • 4.375 10% 350 ms • 4.625 5% 350 ms • 4.72 15% 350 ms •</td> <td>Output Voltage RESET Tolerance RESET Time Output (Note 4) RESET Polarity 3.06 5% 350 ms ◆ LOW 2.88 10% 350 ms ◆ LOW 2.72 15% 350 ms ◆ LOW 2.88 10% 350 ms ◆ LOW 2.88 10% 350 ms ◆ LOW 4.625 5% 350 ms ◆ LOW 4.625 5% 350 ms ◆ LOW 4.375 10% 350 ms ◆ LOW 4.625 5% 350 ms ◆ LOW 4.625 5% 350 ms ◆ LOW 4.625 5% 350 ms ◆ LOW 4.375 10% 350 ms ◆ LOW 4.375 10% 350 ms ◆ LOW 4.625 5% 350 ms ◆ LOW 4.625 5% 350 ms ◆</td> <td>Output Voltage RESET Tolerance RESET Time Output (Note 4) RESET Polarity Package 3.06 5% 350 ms • LOW 3L TO-92 2.88 10% 350 ms • LOW 3L TO-92 2.72 15% 350 ms • LOW 4L SOT-223 2.88 10% 350 ms • LOW 4L SOT-223 2.72 15% 350 ms • LOW 4L SOT-223 4.625 5% 350 ms • LOW 3L TO-92 4.775 10% 350 ms • LOW 3L TO-92 4.125 15% 350 ms • LOW 3L TO-92 4.125 15% 350 ms • LOW 3L TO-92 4.125 15% 350 ms • LOW 4L SOT-223 4.125 15% 350 ms • LOW 4L SOT-223 4.125 15% 350 ms • LOW 4L SOT-223</td>	Output Voltage RESET Tolerance RESET Time 3.06 5% 350 ms 2.88 10% 350 ms 2.72 15% 350 ms 3.06 5% 350 ms 2.88 10% 350 ms 2.72 15% 350 ms 4.625 5% 350 ms 4.375 10% 350 ms 4.38 10% 350 ms 2.72 15% 350 ms 2.72 15% 350 ms 2.88 10% 350 ms 2.72 15% 350 ms 2.72 15% 350 ms 2.72 15% 350 ms 4.625	Output Voltage RESET Tolerance RESET Time Output (Note 4) 3.06 5% 350 ms • 2.88 10% 350 ms • 2.72 15% 350 ms • 3.06 5% 350 ms • 2.88 10% 350 ms • 2.72 15% 350 ms • 4.625 5% 350 ms • 4.375 10% 350 ms • 4.625 5% 350 ms • 4.375 10% 350 ms • 4.375 10% 350 ms • 4.625 5% 350 ms • 4.72 15% 350 ms •	Output Voltage RESET Tolerance RESET Time Output (Note 4) RESET Polarity 3.06 5% 350 ms ◆ LOW 2.88 10% 350 ms ◆ LOW 2.72 15% 350 ms ◆ LOW 2.88 10% 350 ms ◆ LOW 2.88 10% 350 ms ◆ LOW 4.625 5% 350 ms ◆ LOW 4.625 5% 350 ms ◆ LOW 4.375 10% 350 ms ◆ LOW 4.625 5% 350 ms ◆ LOW 4.625 5% 350 ms ◆ LOW 4.625 5% 350 ms ◆ LOW 4.375 10% 350 ms ◆ LOW 4.375 10% 350 ms ◆ LOW 4.625 5% 350 ms ◆ LOW 4.625 5% 350 ms ◆	Output Voltage RESET Tolerance RESET Time Output (Note 4) RESET Polarity Package 3.06 5% 350 ms • LOW 3L TO-92 2.88 10% 350 ms • LOW 3L TO-92 2.72 15% 350 ms • LOW 4L SOT-223 2.88 10% 350 ms • LOW 4L SOT-223 2.72 15% 350 ms • LOW 4L SOT-223 4.625 5% 350 ms • LOW 3L TO-92 4.775 10% 350 ms • LOW 3L TO-92 4.125 15% 350 ms • LOW 3L TO-92 4.125 15% 350 ms • LOW 3L TO-92 4.125 15% 350 ms • LOW 4L SOT-223 4.125 15% 350 ms • LOW 4L SOT-223 4.125 15% 350 ms • LOW 4L SOT-223

^{3.} Add /T to Part Number for Tape and Reel (i.e., ASM18xx–x/T) 4. Internal 5.5 k Ω resistor pull–up 5. LL = Lot Code

Table 6. ORDERING INFORMATION

			Device Su	ımmary			
Part Number (Note 6)	RESET Output Voltage (V)	RESET Tolerance (%)	RESET Time (ms)	Open-Drain Output Stage (Note 7)	SOT-23 Package	RESET Polarity	Package Marking (Note 8)
TIN – LEAD DEVICES	S	•	•	•	•	•	
ASM1816R-5	3.06	5	150	•	•	LOW	RMLL
ASM1816R-10	2.88	10	150	•	+	LOW	RNLL
ASM1816R-15	2.72	15	150	•	•	LOW	RZLL
ASM1816R-20	2.55	20	150	•	•	LOW	ROLL
LEAD FREE DEVICE	s						
ASM1816R-5F	3.06	5	150	•	•	LOW	KMLL
ASM1816R-10F	2.88	10	150	•	•	LOW	KNLL
ASM1816R-15F	2.72	15	150	•	•	LOW	KZLL
ASM1816R-20F	2.55	20	150	•	•	LOW	KOLL
Part Number (Note 6)	RESET Output Voltage (V)	RESET Tolerance (%)	RESET Time (ms)	Open-Drain Output Stage (Note 7)	TO-92 Package	RESET Polarity	Package Marking
TIN - LEAD DEVICES	S						
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
EAD FREE DEVICE	S						
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

^{6.} Add /T to Part Number for Tape and Reel (i.e., ASM18xx-x/T)

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ON Semiconductor Website: www.onsemi.com

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

^{7.} Internal 5.5 kΩ resistor pull-up

^{8.} LL = Lot Code