

POWER MANAGEMENT

Low Power, 3.3V/3.0V μ P Reset – Active LOW, Push-Pull Output

The IMP1815 supply voltage monitor is an improved, low-power replacement for the Dallas Semiconductor DS1815. Maximum supply current over temperature is a low 15 μ A, representing over 50 percent lower power as compared to the DS1815.

The IMP1815 issues 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-percent. 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 IMP1815 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 IMP1810/11/12/16/17, IMP1233D and IMP1233M.

Key Features

- ◆ Improved Dallas DS1815 replacement
 - Over 50% lower maximum supply current
- ◆ Low Supply Current
 - 20 μ A maximum (5.5V)
 - 15 μ A maximum (3.6V)
- ◆ 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 $+85^{\circ}\text{C}$

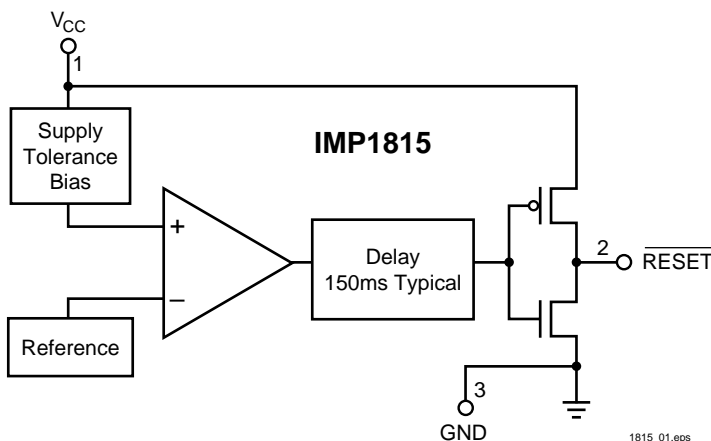
Family Selection Guide

Part	RESET Voltage (V)	RESET Time (ms)	Output Stage	RESET Polarity
IMP1810	4.620, 4.370, 4.120	150	Push-Pull	LOW
IMP1811	4.620, 4.350, 4.130	150	Open-Drain	LOW
IMP1812	4.620, 4.350, 4.130	150	Push-Pull	HIGH
IMP1815	3.060, 2.880, 2.550	150	Push-Pull	LOW
IMP1816	3.060, 2.880, 2.550	150	Open-Drain	LOW
IMP1817	3.060, 2.880, 2.550	150	Push-Pull	HIGH
IMP1233D	4.625, 4.375, 4.125	350	Open-Drain	LOW
IMP1233M	4.625, 4.375, 2.720	350	Open-Drain	LOW

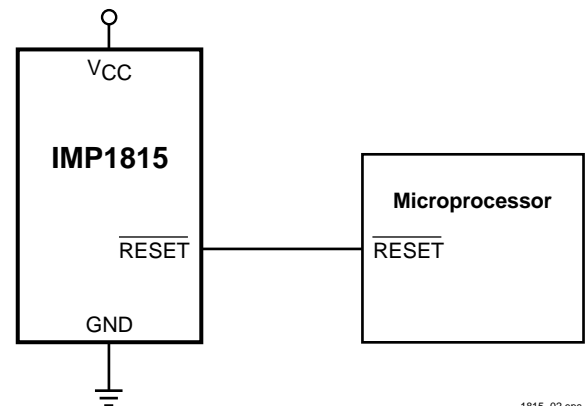
Applications

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

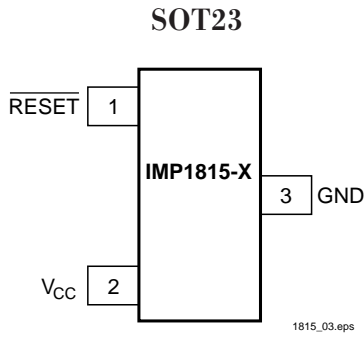
Block Diagram



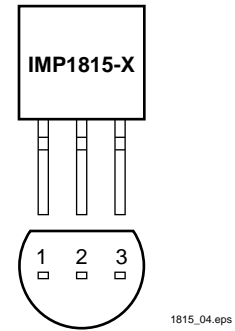
Typical Application



Pin Configuration



TO-92*



Pin Descriptions

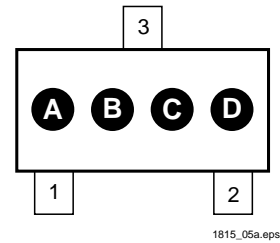
Pin Number	Name	Function
1	RESET	Active LOW reset output
2	V _{CC}	Power supply input
3	GND	Ground

Package Marking Code

SOT-23 Package Letter Code			Part Type
A	B	C	
8	1	5	IMP1815

SOT-23 Package Letter Code	Reset Tolerance
D	
A	5%
B	10%
D	20%

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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
											A = 5% B = 10% D = 20%
IMP1815-5	3.06	5	150	X	X		LOW				
IMP1815-10	2.88	10	150	X	X		LOW				
IMP1815-20	2.55	20	150	X	X		LOW				
IMP1815R-5	3.06	5	150	X		X	LOW	8	1	5	A
IMP1815R-10	2.88	10	150	X		X	LOW	8	1	5	B
IMP1815R-20	2.55	20	150	X		X	LOW	8	1	5	D

1815_13.eps

* Add /S to Part Number for straight (unformed) leads. (ie. IMP18xx-x/S)

** Add /T to Part Number for Tape and Reel. (ie. IMP18xx-x/T)

Absolute Maximum Ratings

Voltage on V_{CC} -0.5V to 7V
 Voltage on \overline{RESET} -0.5V to $V_{CC} + 0.5V$
 Operating Temperature Range -40°C to 85°C

Soldering Temperature 260°C for 10 seconds
 Storage Temperature -55°C to 125°C

Voltages measured with respect to ground.

These are stress ratings only and functional operation is not implied.

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	Units
Supply Voltage	V_{CC}		1.2		5.5	V
Output Voltage	V_{OH}	$I_{OUT} < 500\mu A$	$V_{CC} - 0.5V$	$V_{CC} - 0.1V$		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 (IMP1815-5)	V_{CCTP}		2.98	3.06	3.15	V
V_{CC} Trip Point (IMP1815-10)	V_{CCTP}		2.80	2.88	2.97	V
V_{CC} Trip Point (IMP1815-20)	V_{CCTP}		2.47	2.55	2.64	V
Output Capacitance	C_{OUT}				10	pF
V_{CC} Detect to \overline{RESET}	t_{RPD}			2	5	μs
V_{CC} Slew Rate (V_{CCTP} (MAX) to V_{CCTP} (MIN))	t_F	Note 1	300			μs
V_{CC} Slew Rate (V_{CCTP} (MIN) to V_{CCTP} (MAX))	t_R		0			ns
V_{CC} Detect to \overline{RESET}	t_{RPU}	$t_R = 5\mu s$	100	150	250	ms

Notes 1. The t_F value is for reference in defining values for t_{RPD} and should not be considered a requirement for proper operation or use.

Application Information

Operation – Power Monitor

The IMP1815 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.

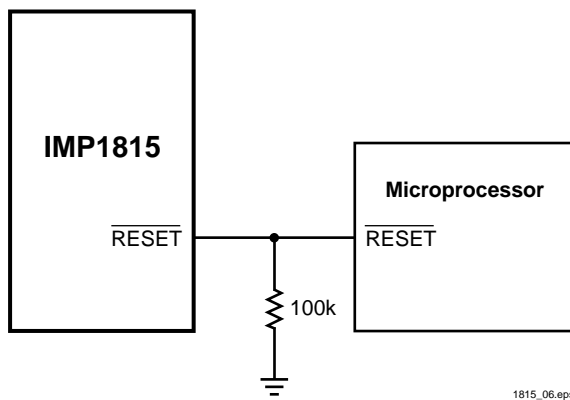


Figure 1. $\overline{\text{RESET}}$ Valid to 0V V_{CC}

Output Conditions

The IMP1815 active LOW reset signal is valid as long as V_{CC} remains above 1.2V. The $\overline{\text{RESET}}$ output on the IMP1815 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 ($\overline{\text{RESET}}$) to Ground (see Figure 1). This configuration will give a valid value on the $\overline{\text{RESET}}$ output with V_{CC} approaching 0V. During both power up and down, this configuration will draw current when $\overline{\text{RESET}}$ is in the high state. A value of 100k Ω should be adequate to maintain a valid condition.

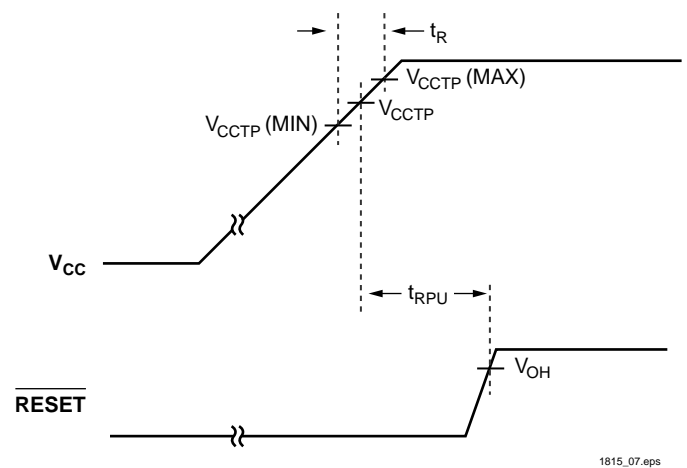


Figure 2. Timing Diagram: Power-Up

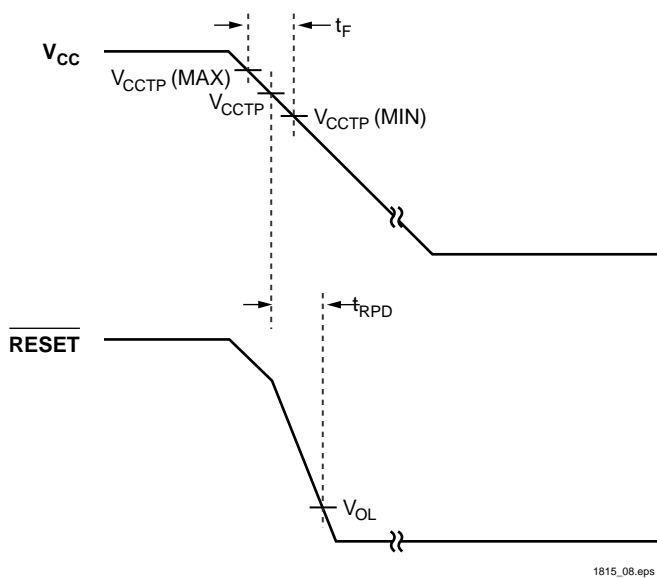


Figure 3. Timing Diagram: Power-Down