

POWER MANAGEMENT

Low Power, 5V μ P Reset

- Active LOW, Open-Drain Output
- 350ms Reset Period

The IMP1233D supply voltage monitor is an improved, low-power replacement for the Dallas Semiconductor DS1233D. Maximum supply current over temperature is a low 20 μ A, representing over 60 percent lower power as compared to the DS1233D.

The IMP1233D 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 15-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 350ms to allow the power supply and system microprocessor to stabilize.

The IMP1233D is designed with an open-drain output stage and operates over the extended industrial temperature range. Devices are available in compact surface mount SOT-223 packages.

Other low power products in this family include the IMP1810/11/12/15/16/17 and IMP1233M.

Key Features

- ◆ Improved Dallas DS1233D replacement
 - Over 60% 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
- ◆ 350ms reset delay after V_{CC} returns to an in-tolerance condition
- ◆ Active LOW power-up reset, 5k Ω internal pull-up
- ◆ Precision temperature-compensated voltage reference and comparator
- ◆ Eliminates external components
- ◆ Motorola 68xxx and HC16 compatible
- ◆ Compact surface mount SOT-223 package
- ◆ Operating temperature -40°C to $+85^{\circ}\text{C}$

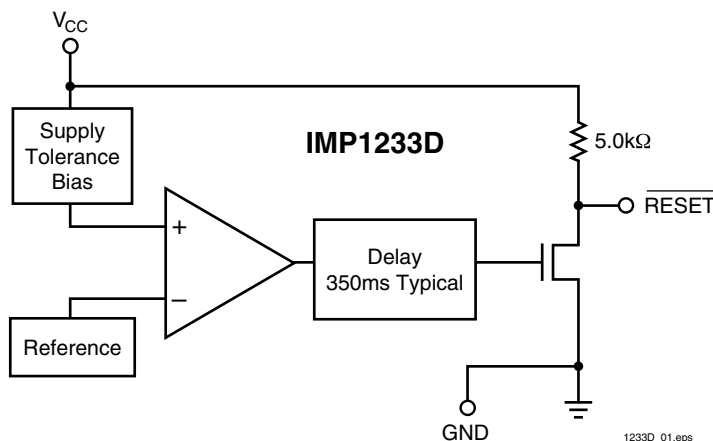
Family Selection Guide

| 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 |

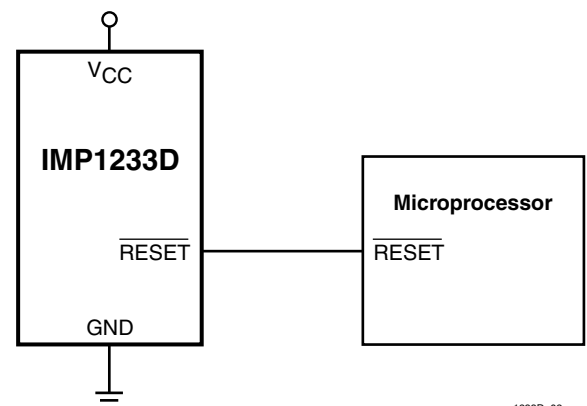
Applications

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

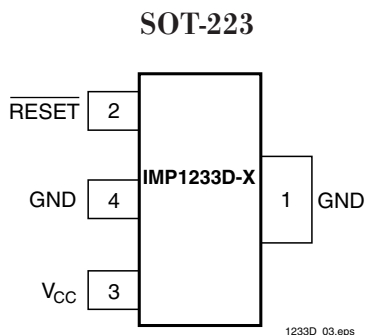
Block Diagram



Typical Application



Pin Configuration



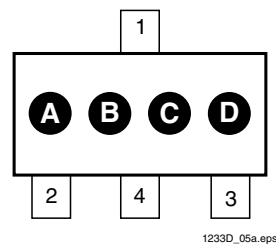
Pin Descriptions

| Pin Numbers | | Name | Function |
|-------------|-------|---------------------------|-------------------------|
| SOT-223 | TO-92 | | |
| 1 | 1 | GND | Ground |
| 2 | 2 | $\overline{\text{RESET}}$ | Active LOW reset output |
| 3 | 3 | V _{CC} | Power supply input |
| 4 | — | GND | Ground (SOT-223 Only) |

Package Marking Code

| Package Letter Code | | | Part Type |
|---------------------|---|---|-----------|
| A | B | C | |
| 3 | 3 | D | IMP1233D |

| Package Letter Code | Reset Tolerance |
|---------------------|-----------------|
| D | |
| A | 5% |
| B | 10% |
| C | 15% |



Ordering Information

| Device Summary | | | | | | | | Package Marking | | | |
|----------------|--------------------------|---------------------|-----------------|--------------|-----------|-----------------|----------------|-----------------|---|---|------------------------------|
| Part** Number | RESET Output Voltage (V) | RESET Tolerance (%) | RESET Time (ms) | Output Stage | | SOT-223 Package | RESET Polarity | A | B | C | D |
| | | | | * Open-Drain | Push-Pull | | | | | | A = 5% B = 10% C = 15% |
| IMP1233DZ-5/T | 4.625 | 5 | 350 | ● | | ● | LOW | 3 | 3 | D | A |
| IMP1233DZ-10/T | 4.375 | 10 | 350 | ● | | ● | LOW | 3 | 3 | D | B |
| IMP1233DZ-15/T | 4.125 | 15 | 350 | ● | | ● | LOW | 3 | 3 | D | C |

* Internal 5kΩ resistor pull up.

** /T indicates Tape and Reel.

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Absolute Maximum Ratings

Voltage on $\overline{V_{CC}}$ -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 $-40^{\circ}C$ to $+85^{\circ}C$.
 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_{OL} | Output = 0.4V, $V_{CC} \geq 2.7V$ | +8 | | | 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 (IMP1233D-5) | V_{CCTP} | | 4.50 | 4.625 | 4.74 | V |
| V_{CC} Trip Point (IMP1233D-10) | V_{CCTP} | | 4.25 | 4.375 | 4.49 | V |
| V_{CC} Trip Point (IMP1233D-15) | V_{CCTP} | | 4.00 | 4.125 | 4.24 | V |
| Internal Pull-Up Resistor | R_P | | 3.5 | 5.0 | 7.5 | k Ω |
| Output Capacitance | C_{OUT} | | | | 10 | pF |
| RESET Active Time | t_{RESET} | | 250 | 350 | 450 | ms |
| V_{CC} Detect to \overline{RESET} Low | t_{RPD} | | | 2 | 5 | μs |
| V_{CC} Slew Rate ($V_{HTL} - V_{LTL}$) | t_F | | 300 | | | μs |
| V_{CC} Slew Rate ($V_{LTL} - V_{HTL}$) | t_R | | 0 | | | ns |
| V_{CC} Detect to \overline{RESET} High | t_{RPU} | $t_R = 5\mu s$ | 250 | 350 | 450 | ms |

Application Information

Operation – Power Monitor

The IMP1233D detects out-of-tolerance power supply conditions. It resets a processor during power-up and issues a reset to the system processor when the monitored power supply voltage is below the reset threshold (power-down). 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 350ms 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.

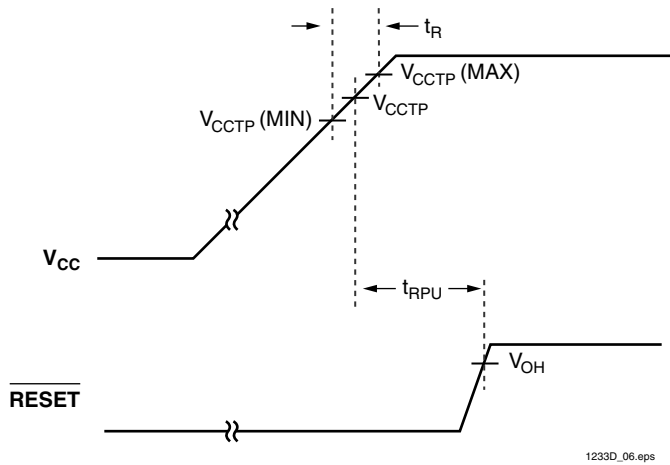


Figure 1. Timing Diagram: Power-Up

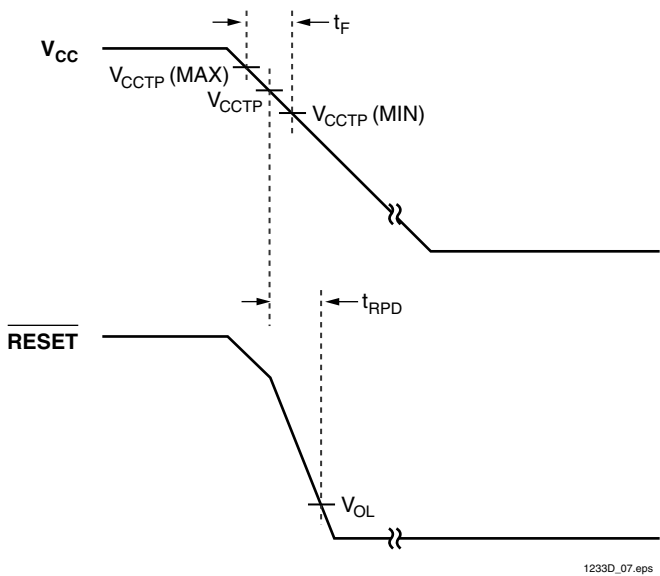
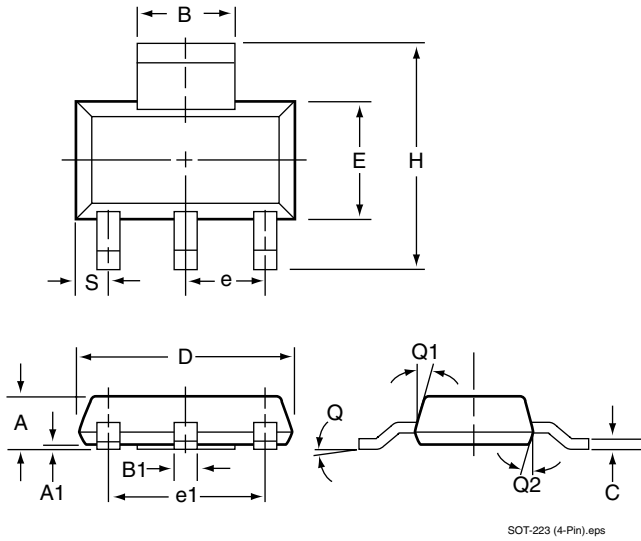


Figure 2. Timing Diagram: Power-Down

Package Dimensions

Plastic SOT-223 (4-Pin)



| | Inches | | Millimeters | |
|---------------------------------|------------|--------|-------------|------|
| | Min | Max | Min | Max |
| Plastic SOT-223* (4-Pin) | | | | |
| A | 0.067 | 0.060 | 1.70 | 1.50 |
| A1 | 0.004 | 0.0008 | 0.10 | 0.02 |
| B | 0.124 | 0.116 | 3.15 | 2.95 |
| B1 | 0.033 | 0.026 | 0.85 | 0.65 |
| C | 0.014 | 0.010 | 0.35 | 0.25 |
| D | 0.264 | 0.248 | 6.70 | 6.30 |
| e | 0.0905 NOM | | 2.30 NOM | |
| e1 | 0.181 NOM | | 4.50 NOM | |
| E | 0.146 | 0.130 | 3.70 | 3.30 |
| h | 0.287 | 0.264 | 7.30 | 6.70 |
| S | 0.041 | 0.033 | 1.05 | 0.85 |
| t | 0.051 | 0.043 | 1.30 | 1.10 |
| Q | 10° MAX | | 10° MAX | |
| Q1 | 16° | 10° | 16° | 10° |
| Q2 | 16° | 10° | 16° | 10° |

* Formed leads are standard.

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