

## GENERAL DESCRIPTION

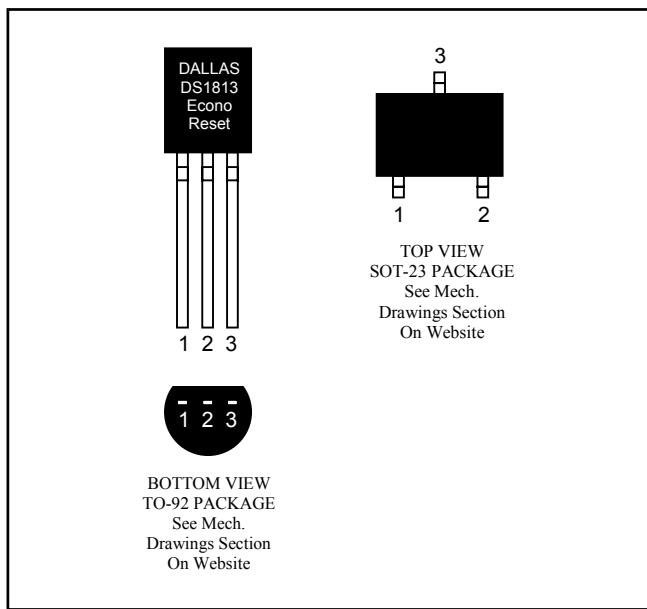
The DS1813 EconoReset uses a precision temperature reference and comparator circuit to monitor the status of the power supply ( $V_{CC}$ ). When an out-of-tolerance condition is detected, an internal power-fail signal is generated which forces reset to the active state. When  $V_{CC}$  returns to an in-tolerance condition, the reset signal is kept in the active state for approximately 150ms to allow the power supply and processor to stabilize.

The DS1813 also monitors a pushbutton on the reset output. If the reset line is pulled low, a reset is generated upon release and will be held in reset output low for typically 150ms.

## FEATURES

- Automatically Restarts a Microprocessor After Power Failure
- Monitors Pushbutton for External Override
- Maintains Reset for Typically 150ms After  $V_{CC}$  Returns to an In-Tolerance Condition
- Reduces Need for Discrete Components
- Precision Temperature-Compensated Voltage Reference and Voltage Sensor
- Low-Cost TO-92 or Space-Saving Surface-Mount SOT-23 Packages Available
- Efficient Open-Drain Output with Internal 5.5k $\Omega$  Pullup Resistor
- -40°C to +85°C Operating Temperature

## PIN CONFIGURATIONS



## PIN DESCRIPTION

| PIN   |        | NAME             | FUNCTION                |
|-------|--------|------------------|-------------------------|
| TO-92 | SOT-23 |                  |                         |
| 1     | 1      | $\overline{RST}$ | Active-Low Reset Output |
| 2     | 2      | $V_{CC}$         | Power Supply            |
| 3     | 3      | GND              | Ground                  |

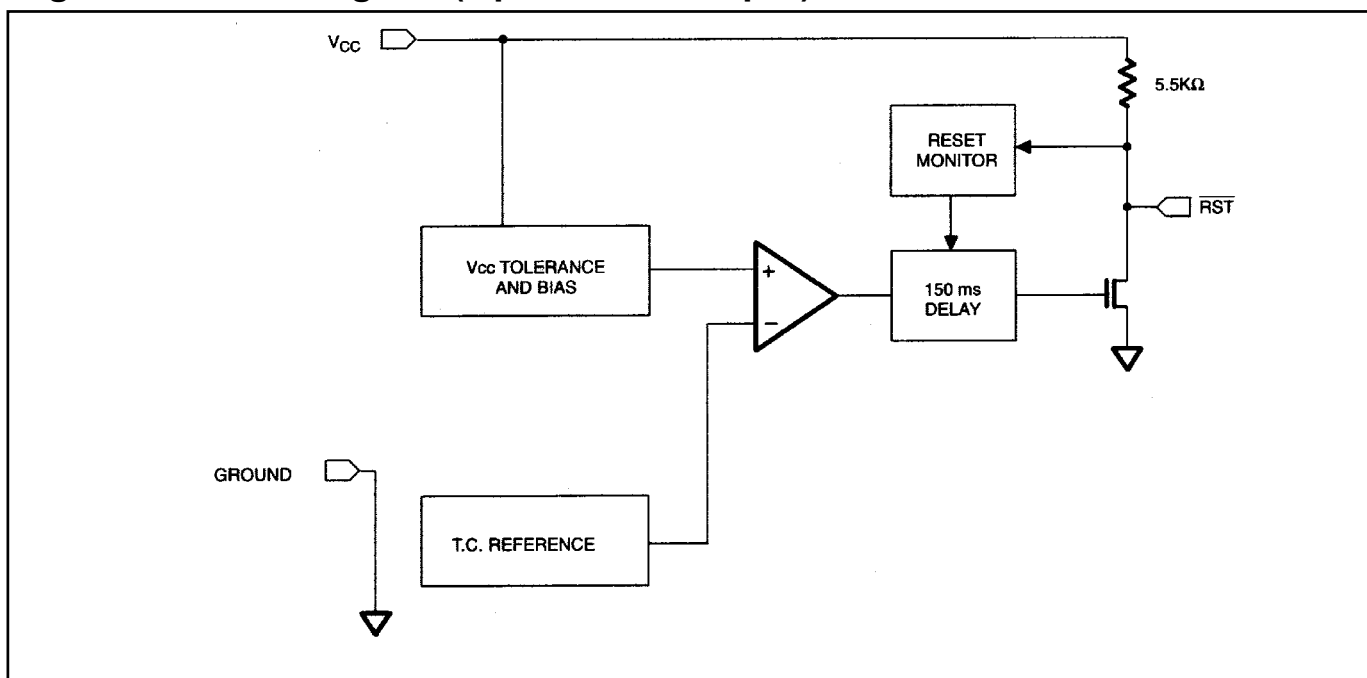
## OPERATION—POWER MONITOR

The DS1813 provides the functions of detecting out-of-tolerance power-supply conditions and warning a processor-based system of impending power failure. When  $V_{CC}$  is detected as out-of-tolerance, the  $\overline{RST}$  signal is asserted. On power-up,  $\overline{RST}$  is kept active for approximately 150ms after the power supply has reached the selected tolerance. This allows the power supply and microprocessor to stabilize before  $\overline{RST}$  is released.

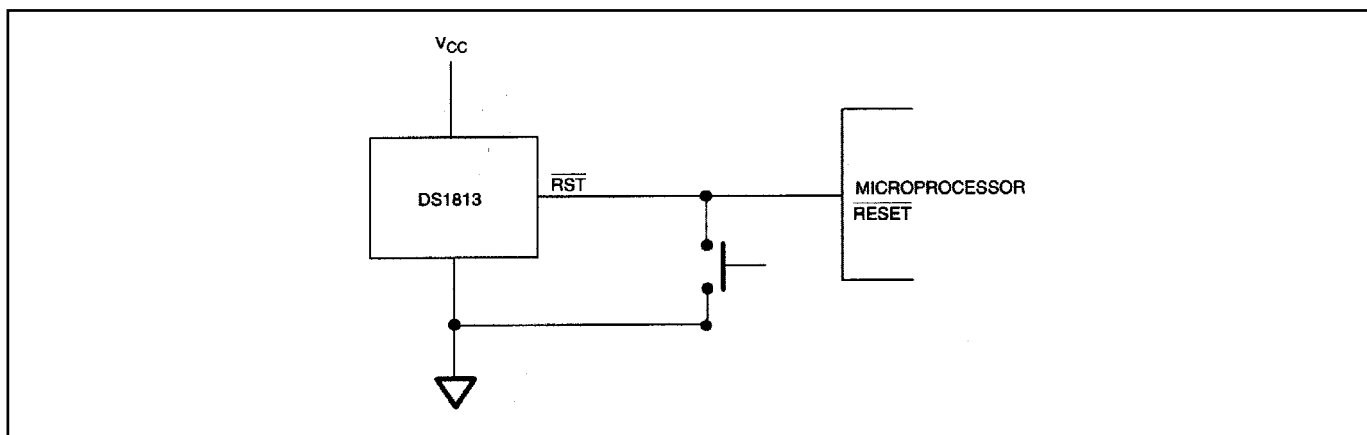
## OPERATION—PUSHBUTTON RESET

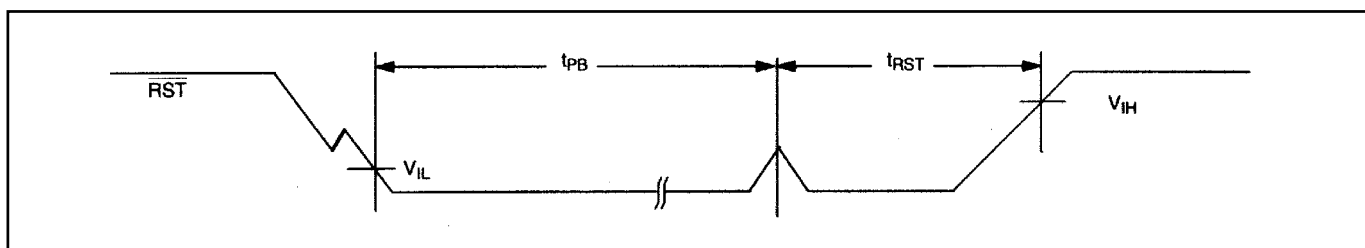
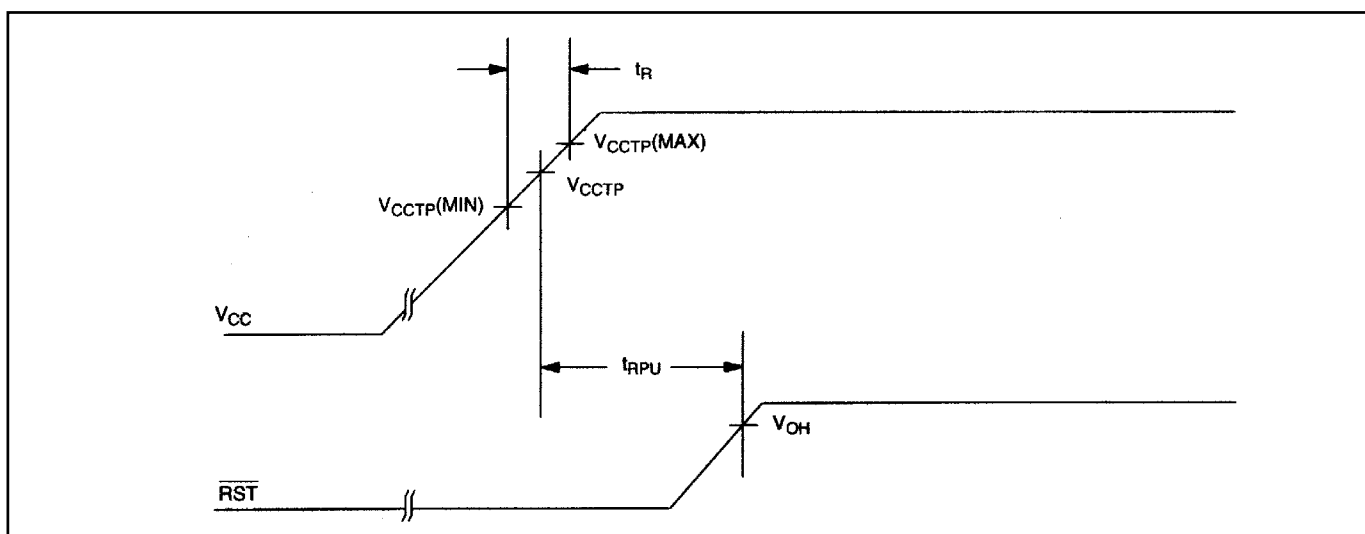
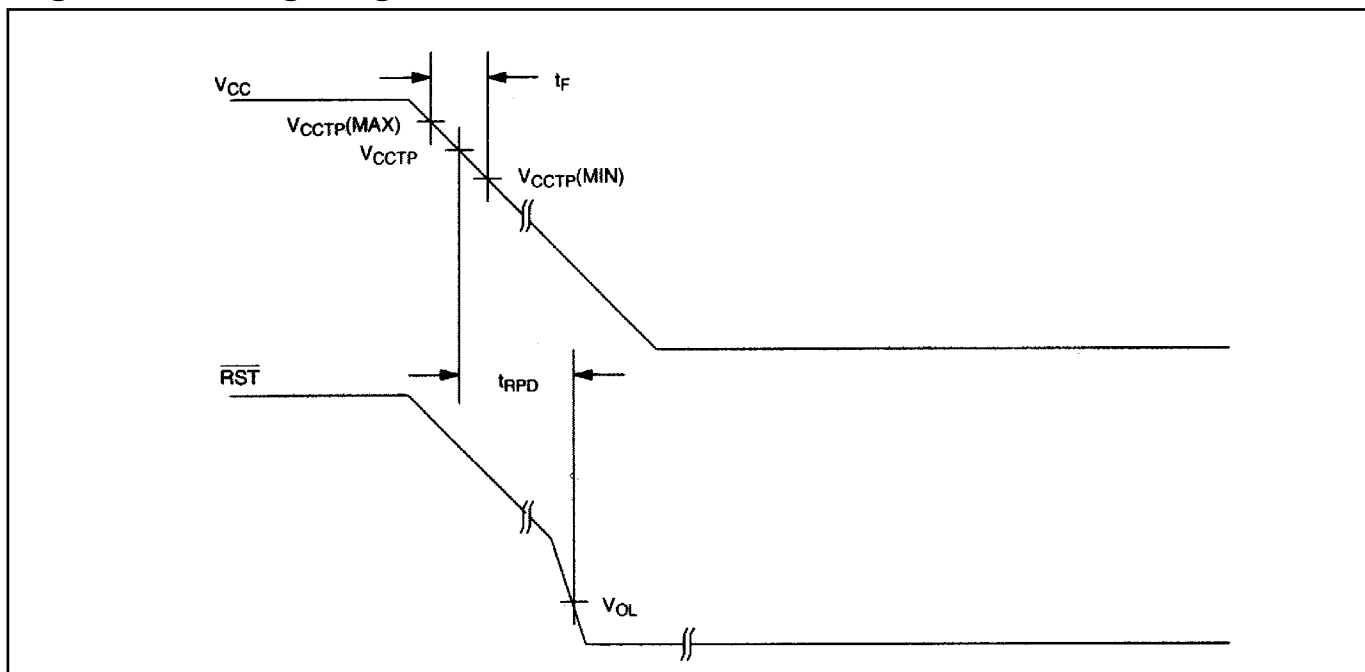
The DS1813 provides for a pushbutton switch for manual reset control. When the DS1813 is not in a reset cycle, a pushbutton reset can be generated by pulling the  $\overline{RST}$  pin low for at least  $1\mu s$ . When the pushbutton is held low, the  $\overline{RST}$  is forced active low and will remain active low for about 150ms after the pushbutton is released. See Figure 2 for an application example and Figure 3 for the timing diagram.

**Figure 1. Block Diagram (Open-Drain Output)**



**Figure 2. Application Example**



**Figure 3. Timing Diagram: Pushbutton Reset****Figure 4. Timing Diagram: Power-Up****Figure 5. Timing Diagram: Power-Down**

## ABSOLUTE MAXIMUM RATINGS

|                                                           |                                       |
|-----------------------------------------------------------|---------------------------------------|
| Voltage Range on $V_{CC}$ Pin Relative to Ground.....     | -0.5V to +7.0V                        |
| Voltage Range on $\overline{RST}$ Relative to Ground..... | -0.5V to ( $V_{CC} + 0.5V$ )          |
| Operating Temperature Range.....                          | -40°C to +85°C                        |
| Storage Temperature Range.....                            | -55°C to +125°C                       |
| Soldering Temperature.....                                | See IPC/JEDEC J-STD-020 Specification |

*This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.*

## RECOMMENDED DC OPERATING CONDITIONS

( $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ )

| PARAMETER      | SYMBOL   | MIN | TYP | MAX | UNITS | NOTES |
|----------------|----------|-----|-----|-----|-------|-------|
| Supply Voltage | $V_{CC}$ | 0   |     | 5.5 | V     | 1     |

## DC ELECTRICAL CHARACTERISTICS

( $V_{CC} = 1.2V$  to  $5.5V$ ,  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ .)

| PARAMETER                               |           | SYMBOL            | MIN                      | TYP  | MAX  | UNITS | NOTES |
|-----------------------------------------|-----------|-------------------|--------------------------|------|------|-------|-------|
| Output Current at 0.4V                  |           | I <sub>OL</sub>   | 10                       |      |      | mA    | 2, 3  |
| Voltage Input Low                       |           | V <sub>IL</sub>   |                          |      | 0.4  | V     | 1     |
| Voltage Input High                      |           | V <sub>IH</sub>   | 0.7 x<br>V <sub>CC</sub> |      |      | V     | 1     |
| Operating Current V <sub>CC</sub> < 5.5 |           | I <sub>CC</sub>   |                          | 30   | 40   | μA    | 4     |
| V <sub>CC</sub> Trip Point              | DS1813-5  | V <sub>CCTP</sub> | 4.50                     | 4.62 | 4.75 | V     | 1     |
|                                         | DS1813-10 |                   | 4.25                     | 4.35 | 4.49 |       |       |
|                                         | DS1813-15 |                   | 4.00                     | 4.13 | 4.24 |       |       |
| Internal Pullup Resistor                |           | R <sub>P</sub>    | 3.50                     | 5.5  | 7.5  | kΩ    | 6     |
| Output Capacitance                      |           | C <sub>OUT</sub>  |                          |      | 10   | pF    |       |

## AC ELECTRICAL CHARACTERISTICS

( $V_{CC} = 1.2V$  to  $5.5V$ ,  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$ .)

| PARAMETER                                                 | SYMBOL      | MIN | TYP | MAX | UNITS         | NOTES |
|-----------------------------------------------------------|-------------|-----|-----|-----|---------------|-------|
| Reset Active Time                                         | $t_{RST}$   | 100 | 150 | 300 | ms            |       |
| $V_{CC}$ Detect to $\overline{RST}$                       | $t_{RPD}$   |     | 2   | 5   | $\mu\text{s}$ |       |
| $V_{CC}$ Slew Rate<br>( $V_{CCTP(MAX)} - V_{CCTP(MIN)}$ ) | $t_F$       | 300 |     |     | $\mu\text{s}$ | 7     |
| $V_{CC}$ Slew Rate<br>( $V_{CCTP(MIN)} - V_{CCTP(MAX)}$ ) | $t_R$       | 0   |     |     | ns            |       |
| $V_{CC}$ Detect to $\overline{RST}$                       | $t_{RPU}$   | 100 | 150 | 300 | ms            | 5     |
| Pushbutton Detect to $\overline{RST}$                     | $t_{PB}$    | 1   |     |     | $\mu\text{s}$ |       |
| Pushbutton Reset                                          | $t_{PBRST}$ | 100 | 150 | 300 | ms            |       |

**NOTES:**

- 1) All voltages are referenced to ground.
- 2) Measured with  $V_{CC} \geq 2.7V$ .
- 3) A  $1k\Omega$  external resistor may be required in some applications for proper operation of the microprocessor reset control circuit.
- 4) Measured with  $\overline{RST}$  output open.
- 5)  $t_R = 5\mu s$ .
- 6)  $V_{OH}$  and  $I_{OH}$  are a function of the value of  $R_P$  and the associated output load conditions.
- 7) This value is for reference in defining values for  $t_{RPD}$  and should not be considered a requirement for proper operation or use of the device.

**PART MARKING CODES**

“A,” “B,” and “C” represent the device type.

810 .... DS1810  
 811 .... DS1811  
 812 .... DS1812  
 813 .... DS1813  
 815 .... DS1815  
 816 .... DS1816  
 817 .... DS1817  
 818 .... DS1818

“D” represents the device tolerance.

A ..... 5%  
 B ..... 10%  
 C ..... 15%  
 D ..... 20%