



## Low Cost Power-On Reset and Watchdog Controllers

### General Description

The MAX698 and MAX699 monitor the +5V supply in microprocessor and digital systems. They supply a RESET pulse of at least 140ms duration on power-up, power-down, and during low voltage "brown out" conditions. Circuit reliability is increased at reduced cost by eliminating all external components and adjustments.

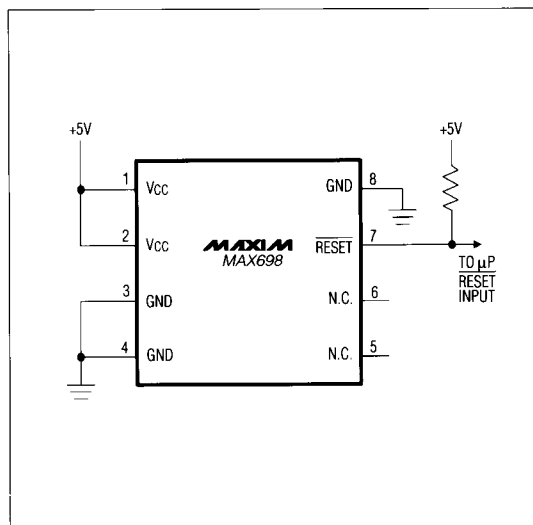
The MAX699 includes all features of the MAX698 but also provides a "watchdog" input to monitor microprocessor activity. The RESET output goes low if the watchdog input (WDI) is not toggled within 1 second. The watchdog feature can be disabled by leaving WDI open.

Both parts are supplied in 8 lead DIP and 16 lead 0.3" wide Small Outline (SO) packages and are specified from 0°C to +70°C for "C" grade devices and -40°C to +85°C for "E" devices. The Small Outline versions, with more pins than the 8 lead DIP, have additional outputs not available in DIP packages. These are RESET (without inversion) and Watchdog Output (WDO).

### Applications

Computers  
Controllers  
Intelligent Instruments  
Automotive Systems  
Critical  $\mu$ P Power Monitoring

### Typical Operating Circuit



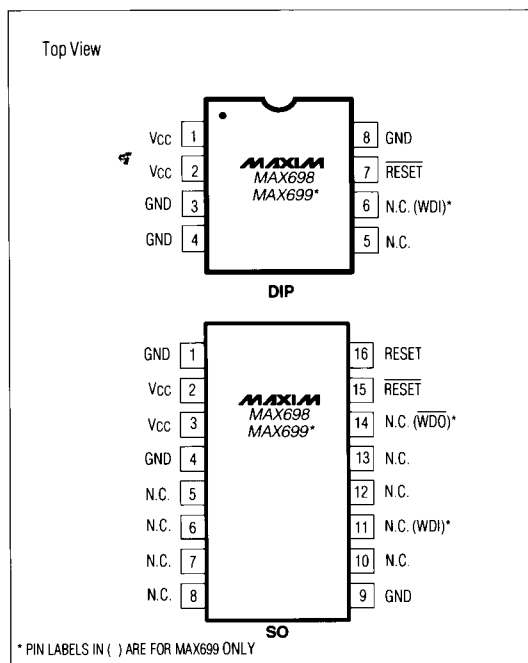
### Features

- ◆ Precision Voltage Monitor
- ◆ Power OK/Reset Time Delay
- ◆ Watchdog Timer
- ◆ Minimum Component Count

### Ordering Information

| PART      | TEMP. RANGE    | PACKAGE            |
|-----------|----------------|--------------------|
| MAX698CPA | 0°C to +70°C   | 8 Lead Plastic DIP |
| MAX698CWE | 0°C to +70°C   | 16 Lead Wide SO    |
| MAX698EPA | -40°C to +85°C | 8 Lead Plastic DIP |
| MAX698EWE | -40°C to +85°C | 16 Lead Wide SO    |
| MAX699CPA | 0°C to +70°C   | 8 Lead Plastic DIP |
| MAX699CWE | 0°C to +70°C   | 16 Lead Wide SO    |
| MAX699EPA | -40°C to +85°C | 8 Lead Plastic DIP |
| MAX699EWE | -40°C to +85°C | 16 Lead Wide SO    |

### Pin Configurations



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MAX698/MAX699

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### ABSOLUTE MAXIMUM RATINGS

|                                                  |                          |                                                |                 |
|--------------------------------------------------|--------------------------|------------------------------------------------|-----------------|
| V <sub>CC</sub> .....                            | -0.3V to 6.0V            | Rate of Rise, V <sub>CC</sub> .....            | 100V/μs         |
| Input Voltage (with respect to GND)              |                          | Power Dissipation                              |                 |
| WDI, WDO, RESET, $\overline{\text{RESET}}$ ..... | -0.3V to V <sub>CC</sub> | Plastic DIP (Derate 5mW/°C above 70°C) .....   | 400mW           |
| Operating Temperature Range                      |                          | Small Outline (Derate 7mW/°C above 70°C) ..... | 600mW           |
| MAX69XC .....                                    | 0°C to +70°C             | Storage Temperature .....                      | -65°C to +150°C |
| MAX69XE .....                                    | -40°C to +85°C           | Lead Temperature (Soldering 10 seconds) .....  | +300°C          |

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions above those indicated in the operations sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

### ELECTRICAL CHARACTERISTICS

(T<sub>A</sub> = 25°C, V<sub>CC</sub> = +5V, unless otherwise noted.)

| PARAMETER                                                | CONDITIONS                                                                                                           | MIN | TYP       | MAX  | UNITS |
|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----|-----------|------|-------|
| Operating Voltage Range                                  | T <sub>A</sub> = Full                                                                                                | 3.0 |           | 5.5  | V     |
| Supply Current                                           |                                                                                                                      |     |           | 5    | mA    |
| Power Up Reset De-Assertion                              | T <sub>A</sub> = Full                                                                                                | 4.5 | 4.65      | 4.75 | V     |
| Power Down Reset Assertion                               | T <sub>A</sub> = Full                                                                                                | 4.4 |           |      | V     |
| Hysteresis                                               |                                                                                                                      |     | 40        |      | mV    |
| Reset Output Pulse Width                                 |                                                                                                                      | 140 |           | 500  | ms    |
| RESET Output<br>Output Low<br>Output High                | (Open Drain)<br>I <sub>SINK</sub> = 1.6mA, V <sub>CC</sub> = 4.4V<br>I <sub>SOURCE</sub> = 1μA, V <sub>CC</sub> = 5V | 3.5 |           | 0.4  | V     |
| RESET Output - SO Pkg. Only<br>Output Low<br>Output High | I <sub>SINK</sub> = 1.6mA, V <sub>CC</sub> = 5V<br>I <sub>SOURCE</sub> = 1μA, V <sub>CC</sub> = 4.4V                 | 3.5 |           | 0.4  | V     |
| WDO Output - SO MAX699 Only<br>Output Low<br>Output High | I <sub>SINK</sub> = 1.6mA, V <sub>CC</sub> = 5V<br>I <sub>SOURCE</sub> = 1μA, V <sub>CC</sub> = 4.4V                 | 3.5 |           | 0.4  | V     |
| MAX699 Watchdog<br>Timeout Period                        |                                                                                                                      | 1.0 | 1.6       | 2.25 | sec   |
| MAX699 Minimum WDI Input<br>Pulse Width                  |                                                                                                                      | 200 |           |      | ns    |
| MAX699 WDI Input Threshold<br>Logic Low<br>Logic High    | V <sub>CC</sub> = +5V                                                                                                | 3.8 |           | 0.8  | V     |
| MAX699 WDI Input Current                                 | WDI = V <sub>CC</sub><br>WDI = 0V                                                                                    | -50 | 20<br>-15 | 50   | μA    |

# Low Cost Power-On Reset and Watchdog Controllers

## Pin Description

**MAX698/MAX699**

| NAME                      | FUNCTION                                                                                                                                                                                                                                                                                                                                    |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| V <sub>CC</sub>           | +5V sense input and MAX698/699 chip power.                                                                                                                                                                                                                                                                                                  |
| GND                       | Chip power GND.                                                                                                                                                                                                                                                                                                                             |
| $\overline{\text{RESET}}$ | Goes low when V <sub>CC</sub> falls below internally set threshold (See Electrical Characteristics).                                                                                                                                                                                                                                        |
| RESET                     | (Small Outline devices only) Goes high when V <sub>CC</sub> falls below internally set threshold.                                                                                                                                                                                                                                           |
| WDI                       | (MAX699 only) A three level input. If WDI remains high or low for more than the watchdog timeout period, $\overline{\text{RESET}}$ pulses low ( $\overline{\text{WDO}}$ also goes low on Small Outline MAX699). If WDI is unconnected or at mid supply, the watchdog circuit is disabled.                                                   |
| $\overline{\text{WDO}}$   | (Small Outline MAX699 only) Goes low when WDI remains high or low for more than the watchdog timeout period. $\overline{\text{WDO}}$ is set high at the next WDI transition. If WDI is unconnected or at mid supply, $\overline{\text{WDO}}$ remains high. $\overline{\text{WDO}}$ also remains high when V <sub>CC</sub> falls below 4.4V. |

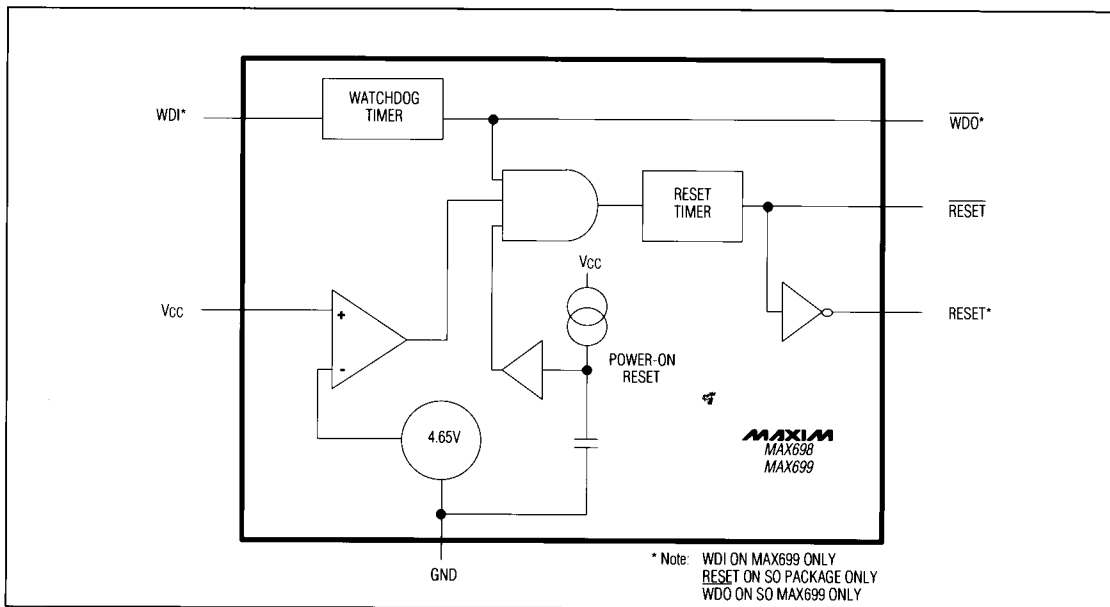
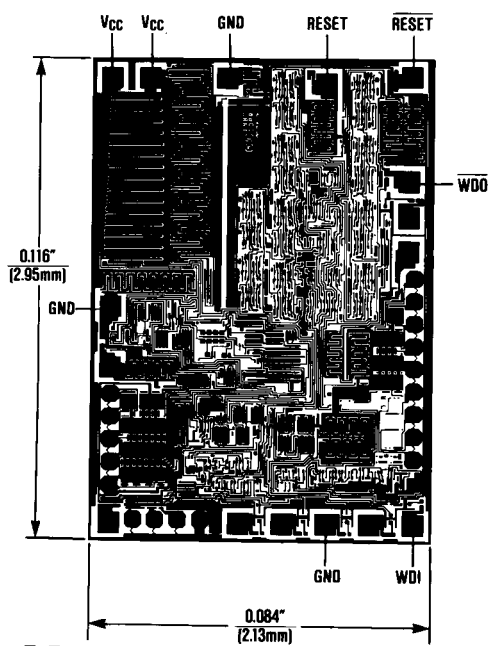


Figure 1. MAX698/699 Block Diagram

**MAX698/MAX699**

## **Low Cost Power-On Reset and Watchdog Controllers**

### **Chip Topography**



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