

# MAXIM

## Low Cost Power-On Reset and Watchdog Controllers

MAX698/MAX699

### 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.

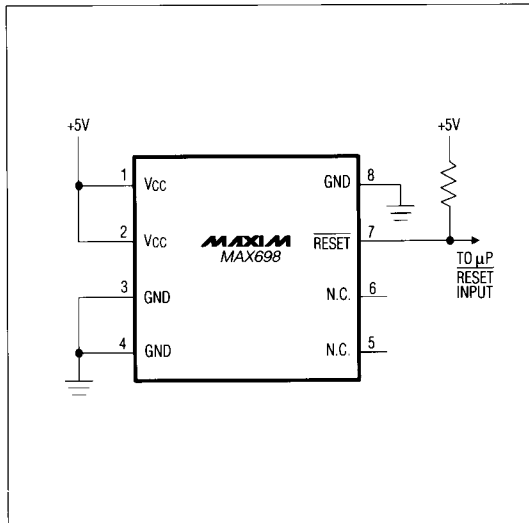
The MAX699 includes all features of the MAX698 but also provides a "watchdog" input to monitor microprocessor activity. The RESET output goes low if the watchdog input (WDI) is not toggled within 1 second. The watchdog feature can be disabled by leaving WDI open.

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



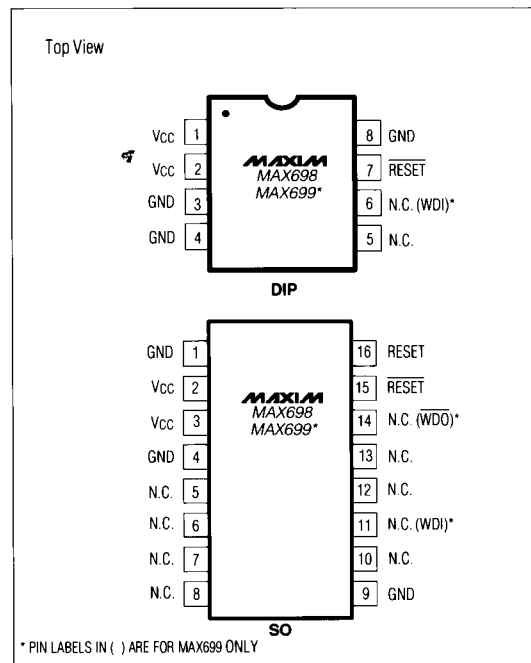
### Features

- ◆ 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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## 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, 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 Output Low Output High	(Open Drain) I <sub>SINK</sub> = 1.6mA, V <sub>CC</sub> = 4.4V I <sub>SOURCE</sub> = 1μA, V <sub>CC</sub> = 5V	3.5		0.4	V
RESET Output - SO Pkg. Only Output Low Output High	I <sub>SINK</sub> = 1.6mA, V <sub>CC</sub> = 5V I <sub>SOURCE</sub> = 1μA, V <sub>CC</sub> = 4.4V	3.5		0.4	V
WDO Output - SO MAX699 Only Output Low Output High	I <sub>SINK</sub> = 1.6mA, V <sub>CC</sub> = 5V I <sub>SOURCE</sub> = 1μA, V <sub>CC</sub> = 4.4V	3.5		0.4	V
MAX699 Watchdog Timeout Period		1.0	1.6	2.25	sec
MAX699 Minimum WDI Input Pulse Width		200			ns
MAX699 WDI Input Threshold Logic Low Logic High	V <sub>CC</sub> = +5V	3.8		0.8	V
MAX699 WDI Input Current	WDI = V <sub>CC</sub> WDI = 0V	-50	20 -15	50	μA

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## 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.

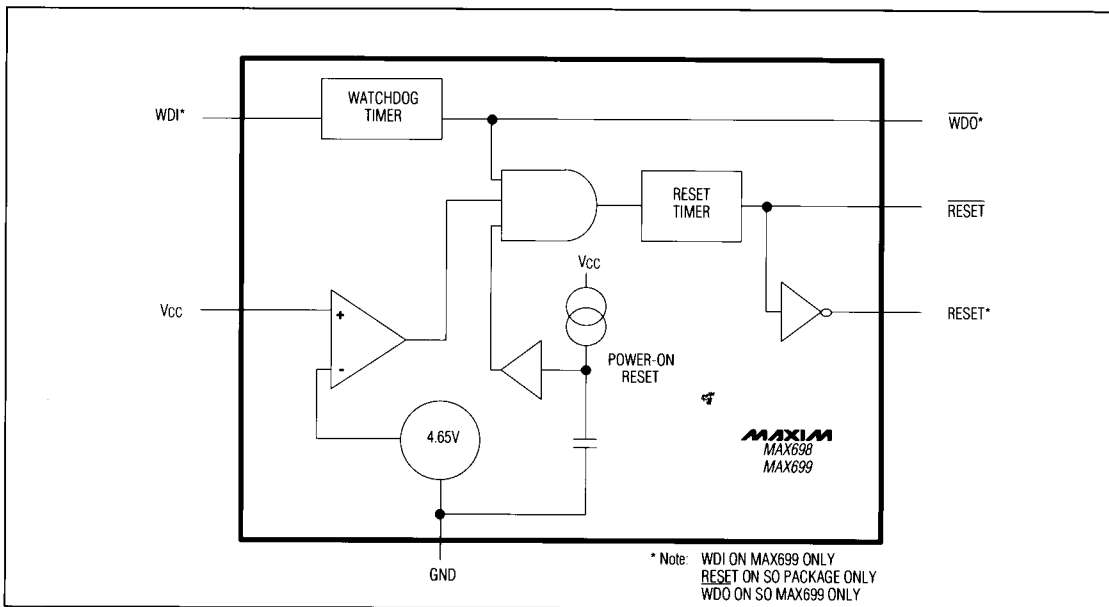
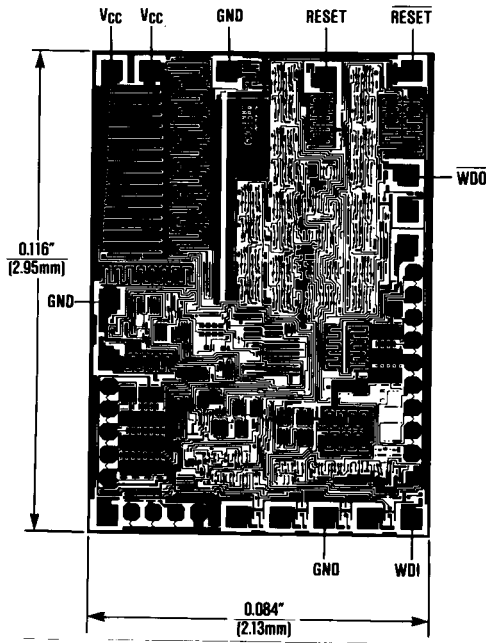


Figure 1. MAX698/699 Block Diagram

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## Chip Topography

**MAX698/MAX699**



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4 **Maxim Integrated Products, 120 San Gabriel Drive, Sunnyvale, CA 94086 (408) 737-7600**

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