

Microprocessor Supervisory Circuits

ADM698/ADM699

FEATURES

Superior Upgrade for MAX698/MAX699
Guaranteed RESET Assertion with V_{CC} = 1 V
Low 0.6 mA Supply Current
Precision 4.65 V Voltage Monitor
Power OK/Reset Time Delay
Watchdog Timer
Minimum Component Count
Performance Specified over Temperature

APPLICATIONS
Microprocessor Systems
Computers
Controllers
Intelligent Instruments
Automotive Systems
Critical µP Power Monitoring

GENERAL DESCRIPTION

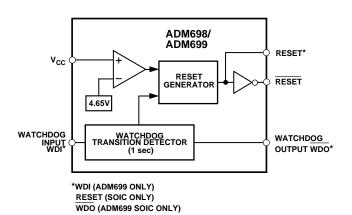
The ADM698/ADM699 supervisory circuits provide power supply monitoring and watchdog timing for microprocessor systems.

The ADM698 monitors the 5 V V_{CC} power supply and generates a \overline{RESET} pulse during power up, power down and during low voltage "Brown Out" conditions. The \overline{RESET} output is guaranteed to be functional (logic low) with V_{CC} as low as 1 V.

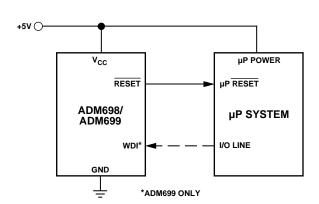
The ADM699 features an identical monitoring circuit as in the ADM698 plus an additional watchdog timer input to monitor microprocessor activity. The RESET output is forced low if the watchdog input is not toggled within the 1 second watchdog timeout period.

Both parts are available in 8-pin plastic DIP and 16-lead SOIC packages. The 16-lead SOIC contains additional outputs RESET (without inversion) and Watchdog Output WDO (ADM699 only).

FUNCTIONAL BLOCK DIAGRAM



TYPICAL APPLICATION CIRCUIT



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$ADM698/ADM699 — SPECIFICATIONS (v_{cc} = +5 \text{ V} \pm 10\%, T_A = T_{MIN} \text{ to } T_{MAX} \text{ unless otherwise noted})$

Parameter	Min	Typ	Max	Units	Test Conditions/Comments
V _{CC} Operating Voltage Range	3.0		5.5	V	
Supply Current		0.6	1.95	mA	
Power-Down Reset Assertion	4.5	4.65	4.73	V	
Power-Up Reset Deassertion			4.73	V	
Reset Threshold Hysteresis		40		mV	
Reset Active Time	140	200	280	ms	$T_A = +25^{\circ}C, V_{CC} = +5 V$
Watchdog Timeout Period (ADM699)	1.0	1.6	2.25	s	$T_A = +25^{\circ}C, V_{CC} = +5 V$
Minimum WDI Input Pulse Width	50			ns	$V_{IL} = 0.4, V_{IH} = 3.5 V$
RESET Output Voltage			0.4	V	$I_{SINK} = 1.6 \text{ mA}, Vcc = 4.4 \text{ V}$
\overline{RESET} Output Voltage ($V_{CC} = 1 \text{ V}$)		4	200	mV	$I_{SINK} = 10 \mu\text{A}, V_{CC} = 1.0 \text{V}$
2 0 , 50 ,	3.5			V	$I_{\text{SOURCE}} = 1 \mu\text{A}, V_{\text{CC}} = 5 \text{V}$
RESET and WDO Output Voltage			0.4	V	$I_{SINK} = 1.6 \text{ mA}, V_{CC} = 5 \text{ V}$
	3.5			V	$I_{\text{SOURCE}} = 1 \mu\text{A}, V_{\text{CC}} = 4.4 \text{V}$
RESET Output Short Circuit Current		25		mA	Output Sink Current
WDI Input Threshold (ADM699)					
Logic Low			0.8	V	
Logic High	3.5			V	
WDI Input Current		20	50	μA	WDI = V_{CC} , $T_A = +25$ °C
•	-50	-20		μA	WDI = 0 V, $T_A = +25^{\circ}C$

Specifications subject to change without notice.

ABSOLUTE MAXIMUM RATINGS*

$(T_A = +25^{\circ}C \text{ unless otherwise noted})$
V_{CC} 0.3 V to +6 V
All Other Inputs -0.3 V to V_{CC} + 0.3 V
Power Dissipation 8-Pin DIP 500 mW
θ_{JA} , Thermal Impedance +120°C/W
Power Dissipation 16-Pin SOIC375 mW
θ_{JA} , Thermal Impedance +110°C/W
Power Dissipation 8-Pin Cerdip 500 mW
θ_{JA} , Thermal Impedance +125°C/W
Operating Temperature Range
Industrial (A Version)40°C to +85°C
Extended (S Version)55°C to +125°C
Storage Temperature Range65°C to +150°C
Lead Temperature (Soldering, 10 secs) +300°C
Vapor Phase (60 secs)+215°C
Infrared (15 secs) +220°C

^{*}Stresses above those listed under "Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those listed in the operational sections of this specification is not implied. Exposure to absolute maximum ratings for extended periods of time may affect device reliability.

ORDERING GUIDE

Model	Temperature Range	Package Option
ADM698AN	-40°C to +85°C	N-8
ADM698AR	-40°C to +85°C	R-16
ADM698AQ	-40°C to +85°C	Q-8
ADM698SQ	-55°C to +125°C	Q-8
ADM699AN	-40°C to +85°C	N-8
ADM699AR	-40°C to +85°C	R-16
ADM699AQ	-40°C to +85°C	Q-8
ADM699SQ	-55°C to +125°C	Q-8

CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although the ADM698/ADM699 features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

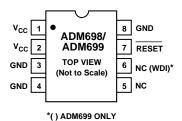


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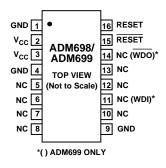
PIN FUNCTION DESCRIPTION

Mnemonic	Function
$\overline{\mathrm{V}_{\mathrm{CC}}}$	+5 V Power Supply Input.
GND	0 V. Ground reference for all signals.
RESET	Logic Output. \overline{RESET} goes low whenever V_{CC}
	falls below the reset voltage threshold (4.65 V
	typ). RESET remains low for a minimum of
	140 ms after V _{CC} returns to 5 V. RESET also goes low for a minimum of 140 ms if the watchdog
	timer is enabled but not serviced within its time-
	out period.
WDI	Watchdog Input. WDI is a three level input. If
	WDI remains either high or low for longer than
	the watchdog timeout period, RESET pulses low
	and WDO goes low. The timer resets with each transition on the WDI line. The watchdog timer
	may be disabled if WDI is left floating or is driven
	to midsupply.
RESET	(SOIC packages only) Logic Output. RESET is
	an active high output. It is the inverse of RESET.
$\overline{ ext{WDO}}$	(SOIC ADM699 only) Logic Output. The
	Watchdog Output, WDO, goes low if WDI
	remains either high or low for longer than the
	watchdog timeout period. WDO is set high by the next transition at WDI. If WDI is unconnected or
	at midsupply, the watchdog timer is disabled and
	WDO remains high.

PIN CONFIGURATION (DIP)



PIN CONFIGURATION (SOIC)



TYPICAL PERFORMANCE CURVES

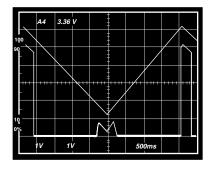


Figure 1. RESET Output Voltage vs. V_{CC}

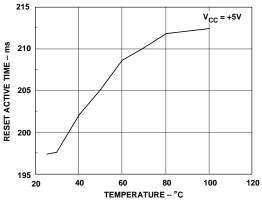


Figure 2. RESET Active Time vs. Temperature

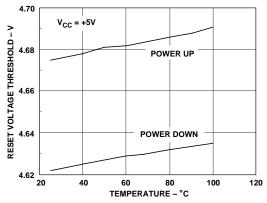


Figure 3. RESET Voltage Threshold vs. Temperature

ADM698/ADM699

CIRCUIT INFORMATION Power Fail RESET

 \underline{A} precision voltage detector monitors V_{CC} and generates a \overline{RESET} output to hold the microprocessor's Reset line low when V_{CC} falls below the reset threshold (4.65 V) (see Figure 4). The reset voltage threshold is set to accommodate a 5% variation on $V_{CC}.$ The voltage detector has 40 mV hysteresis to ensure that glitches on V_{CC} do not activate the \overline{RESET} output.

On power up, an internal monostable holds \overline{RESET} low for 140 ms after V_{CC} rises above the reset threshold. This allows the power supply to stabilize on power up and also prevents repeated toggling of \overline{RESET} even if the 5 V power drops out and recovers with each power line cycle. In order to prevent mistriggering due to transient voltage spikes, it is recommended that a $0.1~\mu F$ capacitor be connected at the V_{CC} pin.

The \overline{RESET} output is guaranteed to remain low with V_{CC} as low as 1 V. This holds the microprocessor in a stable shutdown condition as the power supply comes up.

On the 16-lead SOIC package, an active high RESET output is also provided. This is the complement of RESET and is intended for microprocessors requiring an active high signal.

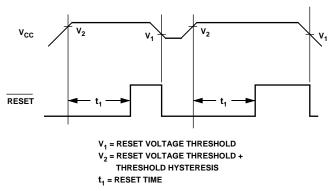


Figure 4. Watchdog Timeout Period vs. Temperature

Watchdog Timer (ADM699 Only)

The watchdog timer input (WDI) monitors an I/O line from the μP system. The μP must toggle this input once every 1.6 seconds to verify correct software execution. Failure to toggle the line indicates that the μP system is not correctly executing its program and may be tied up in an endless loop. If this happens, a reset pulse is generated to initialize the processor.

The WDI input is a three level input and will recognize a low to- high or a high-to-low transition on its input. The watchdog timer is reset by each WDI transition and then begins its timeout period. If the WDI pin remains either high or low, reset pulses will be issued every 1.6 seconds typically. If the watchdog timer is not needed, the WDI input should be left floating.

The Watchdog Output (\overline{WDO}) (SOIC package Only) provides watchdog status information. It is driven low if WDI is not toggled within the watchdog timeout period. It goes high at the next WDI transition. It is also set high when V_{CC} falls below the reset threshold.

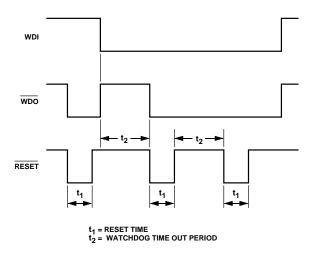
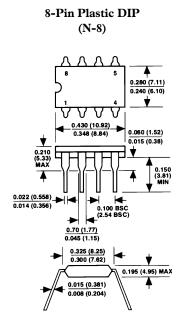
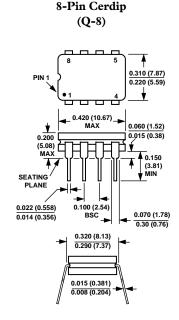


Figure 5. Watchdog Timeout Period and Reset Active Time

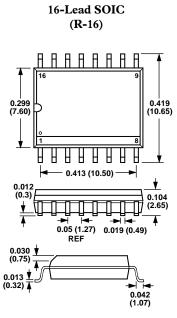
OUTLINE DIMENSIONS

Dimensions shown in inches and (mm).





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