



# Power-Supply Monitor with Reset

MAX700/701/702

## General Description

The MAX700/701/702 are supervisory circuits used to monitor the power supplies in  $\mu$ P and digital systems. The RESET/RESET outputs of the MAX700/701/702 are guaranteed to be in the correct state for VCC voltages down to +1V (Figure 4). They provide excellent circuit reliability and low cost by eliminating external components and adjustments when used with +5V powered circuits.

The MAX702 is the simplest part in the family. When VCC falls to 4.65V, RESET goes low. The MAX702 also provides a debounced manual reset input. The MAX701 performs the same functions but has both RESE $\bar{T}$  and RESE $T$  outputs. Their primary function is to provide a system reset. Accordingly, an active reset signal is supplied for low supply voltages and for at least 200ms after the supply voltage reaches its operating value.

In addition to the features of the MAX701 and MAX702, the MAX700 provides preset or adjustable voltage detection so thresholds other than 4.65V can be selected, and adjustable hysteresis. All parts are supplied in 8-pin Plastic DIP and Narrow SO packages in commercial and extended temperature ranges.

## Applications

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

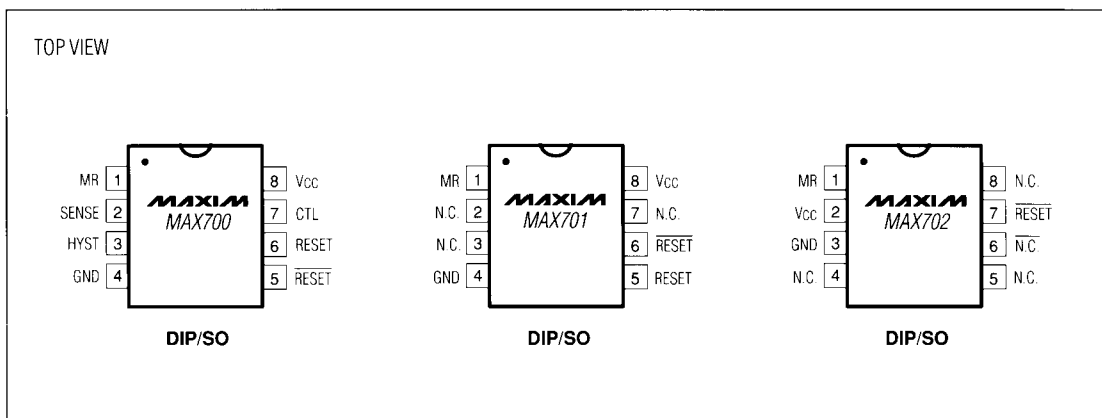
## Features

- ◆ Min 200ms RESE $\bar{T}$  Pulse on Power-Up, Power-Down, and During Low-Voltage Conditions
- ◆ Reset Threshold Factory Trimmed for +5V Systems
- ◆ No External Components or Adjustments With +5V Powered Circuits
- ◆ Debounced Manual Reset Input
- ◆ Preset or Adjustable Voltage Detection (MAX700)
- ◆ Adjustable Hysteresis (MAX700)
- ◆ 8-Pin Plastic DIP and Narrow SO Packages

## Ordering Information

PART	TEMP. RANGE	PIN-PACKAGE
MAX700CPA	0°C to +70°C	8 Plastic DIP
MAX700CSA	0°C to +70°C	8 Narrow SO
MAX700C/D	0°C to +70°C	Dice
MAX700EPA	-40°C to +85°C	8 Plastic DIP
MAX700ESA	-40°C to +85°C	8 Narrow SO
MAX701CPA	0°C to +70°C	8 Plastic DIP
MAX701CSA	0°C to +70°C	8 Narrow SO
MAX701C/D	0°C to +70°C	Dice
MAX701EPA	-40°C to +85°C	8 Plastic DIP
MAX701ESA	-40°C to +85°C	8 Narrow SO
MAX702CPA	0°C to +70°C	8 Plastic DIP
MAX702CSA	0°C to +70°C	8 Narrow SO
MAX702C/D	0°C to +70°C	Dice
MAX702EPA	-40°C to +85°C	8 Plastic DIP
MAX702ESA	-40°C to +85°C	8 Narrow SO

## Pin Configurations



Maxim Integrated Products 1

Call toll free 1-800-998-8800 for free samples or literature.

## Power-Supply Monitor with Reset

### ABSOLUTE MAXIMUM RATINGS

V <sub>CC</sub> .....	-0.3V to +15.5V	Rate of Rise, V <sub>CC</sub> .....	100V/μs
Voltage (with respect to GND) at RESET, RESET, HYST, CTL, SENSE .....	-0.3V to V <sub>CC</sub>	Power Dissipation, any package .....	380mW
Operating Temperature Range		Storage Temperature Range .....	-65°C to +150°C
MAX70_C .....	0°C to +70°C	Lead Temperature (Soldering, 10 sec.) .....	300°C
MAX70_E .....	-40°C to +85°C		

Stresses beyond 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 beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect the device reliability.

### ELECTRICAL CHARACTERISTICS

(T<sub>A</sub> = 25°C, V<sub>CC</sub> = +5V, CTL = GND on MAX700, unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V <sub>CC</sub> Monitor Voltage Range MAX700 Only	T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub> CTL = V <sub>CC</sub>	3		15	V
Min V <sub>CC</sub> For Valid Reset Output, Declining Supply	T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub> RESET ≤ 0.4V when sinking 1mA	1.5	1		V
Supply Current			100	200	μA
Reset Threshold Power-up Power-down	T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub>	4.5 4.5	4.65 4.62	4.75 4.75	V
Internal Hysteresis	HYST not connected		30		mV
Reset Output Pulse Width		200	350	500	ms
RESET Fall Time	MAX700/701 Only, C <sub>LOAD</sub> = 100pF		200		ns
V <sub>CC</sub> Pulse Duration Guaranteeing No Reset Reset	5V to 4V V <sub>CC</sub> Pulse	100	10 10	1	μs
MR Input Threshold			0.7		V
MR Pullup Current			-5	-30	μA
<b>MAX700</b>					
RESET Output Low	I <sub>SINK</sub> = 3.2mA, V <sub>CC</sub> = 5V			0.4	V
RESET Output High	I <sub>SINK</sub> = 1.6mA, V <sub>CC</sub> = 3V I <sub>SOURCE</sub> = 3.2mA, V <sub>CC</sub> = 4.25V I <sub>SOURCE</sub> = 1.6mA, V <sub>CC</sub> = 3V I <sub>SOURCE</sub> = 0.5mA, V <sub>CC</sub> = 1.5V	V <sub>CC</sub> -0.4 V <sub>CC</sub> -0.4 V <sub>CC</sub> -0.4		0.4	
RESET Output Low	I <sub>SINK</sub> = 16mA, V <sub>CC</sub> = 4.25V I <sub>SINK</sub> = 1.6mA, V <sub>CC</sub> = 3V I <sub>SINK</sub> = 0.4mA, V <sub>CC</sub> = 1.5V			0.4 0.4 0.4	
RESET Output High	I <sub>SOURCE</sub> = 3.2mA, V <sub>CC</sub> = 5V I <sub>SOURCE</sub> = 1.6mA, V <sub>CC</sub> = 3V	V <sub>CC</sub> -0.4 V <sub>CC</sub> -0.4			V
<b>MAX701</b>					
RESET Output Low RESET Output High	I <sub>SINK</sub> = 16mA, V <sub>CC</sub> = 5V I <sub>SOURCE</sub> = 3.2mA, V <sub>CC</sub> = 4.25V I <sub>SOURCE</sub> = 1.6mA, V <sub>CC</sub> = 3V I <sub>SOURCE</sub> = 0.5mA, V <sub>CC</sub> = 1.5V	V <sub>CC</sub> -0.4 V <sub>CC</sub> -0.4 V <sub>CC</sub> -0.4		0.4	V
RESET Output Low RESET Output High	I <sub>SINK</sub> = 3.2mA, V <sub>CC</sub> = 4.25V I <sub>SINK</sub> = 1.6mA, V <sub>CC</sub> = 3V I <sub>SINK</sub> = 0.4mA, V <sub>CC</sub> = 1.5V I <sub>SOURCE</sub> = 3.2mA, V <sub>CC</sub> = 5V	V <sub>CC</sub> -0.4		0.4 0.4 0.4	V

# Power-Supply Monitor with Reset

**MAX700/701/702**

## ELECTRICAL CHARACTERISTICS (continued)

(T<sub>A</sub> = 25°C, V<sub>CC</sub> = +5V, CTL = GND on MAX700, unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
<b>MAX702</b>					
RESET Output Low	I <sub>SINK</sub> = 3.2mA, V <sub>CC</sub> = 4.25V I <sub>SINK</sub> = 1.6mA, V <sub>CC</sub> = 3V I <sub>SINK</sub> = 0.4mA, V <sub>CC</sub> = 1.5V			0.4 0.4 0.4	V
RESET Output High	I <sub>SOURCE</sub> = 3.2mA, V <sub>CC</sub> = 5V	V <sub>CC</sub> -0.4			
<b>MAX700 ONLY (CTL = V<sub>CC</sub>, unless otherwise noted.)</b>					
SENSE Input Threshold	T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub>	1.25	1.29	1.35	V
SENSE Input Current			0.1		nA
HYST Input On Resistance			0.5		kΩ
CTL Input Threshold			2		V
CTL Pulldown Current			30	100	μA

## Pin Description

NAME	FUNCTION
V <sub>CC</sub>	Chip power and +5V sensing input (when CTL = GND on MAX700).
GND	Ground
RESET	Goes low when V <sub>CC</sub> falls below 4.65V, or when CTL = V <sub>CC</sub> on the MAX700 goes low when SENSE falls below 1.9V.
RESET	MAX700, 701 only – Inverted Version of RESET.
MR	Input for manual push button reset. Has internal 5μA pull up. Low input activates the RESET/RESET outputs.
CTL	MAX700 only – When CTL = GND, V <sub>CC</sub> is monitored by the reset circuit. When CTL = V <sub>CC</sub> , V <sub>CC</sub> is ignored and SENSE is monitored, allowing the threshold to be set with external resistors.
HYST	MAX700 only – Normally NOT used when voltage is monitored through V <sub>CC</sub> (CTL = GND). When monitoring through SENSE (CTL = V <sub>CC</sub> ), HYST allows hysteresis to be added, reducing noise and spurious reset activity (Figure 3). HYST turns on 5μs before the RESET/RESET outputs are activated, and its on resistance to GND is typically 1kΩ.
SENSE	MAX700 only – The voltage sense input when CTL = V <sub>CC</sub> . Its threshold is 1.29V. Sense always remains connected to the internal comparator. So, when V <sub>CC</sub> is being monitored internally (CTL = GND), SENSE should be left open circuit.

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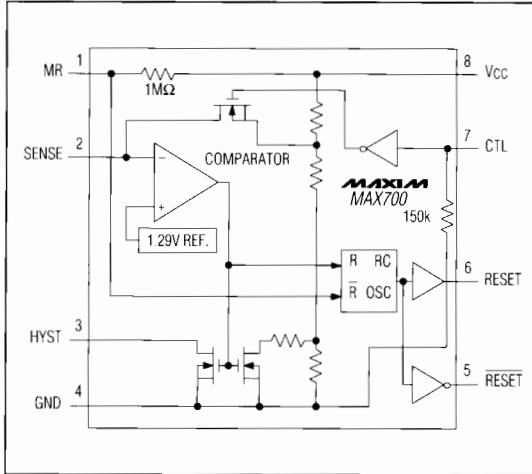


Figure 1. MAX700 Block Diagram

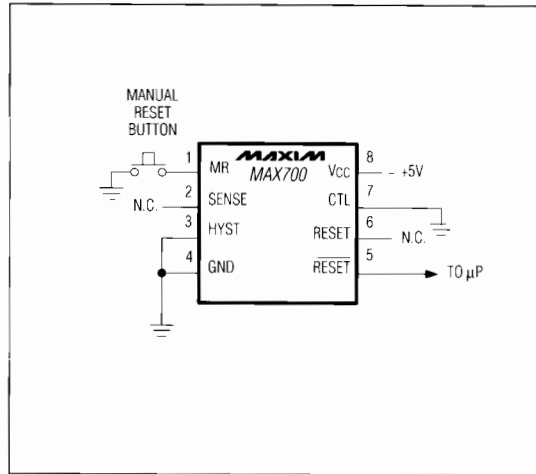


Figure 2. MAX700 Typical Connection Diagram

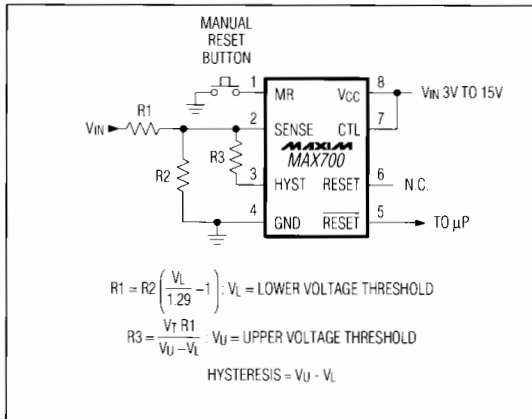


Figure 3. MAX700 Connected for External Sense and Hysteresis

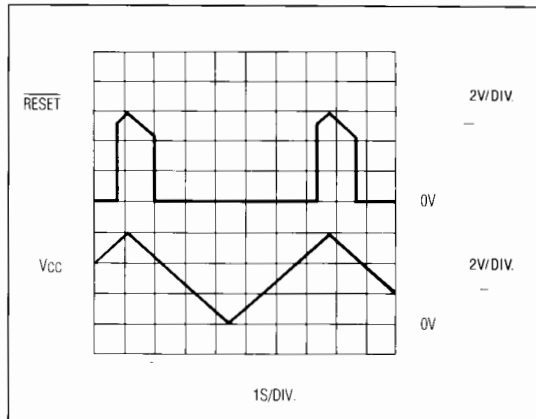


Figure 4. Typical MAX700/701/702  $\overline{\text{RESET}}$  Output vs.  $V_{CC}$

Figure 4 shows the  $\overline{\text{RESET}}$  output of the MAX700/701/702 in the correct state for  $V_{CC}$  voltages down to 0V. Note the effect of the built-in hysteresis on the trigger level of  $\overline{\text{RESET}}$ .

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

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