19-2690; Rev 2; 12/07

MAXIM

Power-Supply Monitor with Reset

General Description

The MAX700/MAX701/MAX702 are supervisory circuits used to monitor the power supplies in microprocessor (µP) and digital systems. The RESET/RESET outputs of the MAX700/MAX701/MAX702 are guaranteed to be in the correct state for V_{CC} 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 V_{CC} 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 RESET and RESET 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 PDIP and Narrow SO packages in commercial and extended temperature ranges.

Applications

Computers

Controllers

Intelligent Instruments

Automotive Systems

Critical µP Power Monitoring

Features

- **Min 200ms RESET 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 PDIP and Narrow SO Packages**

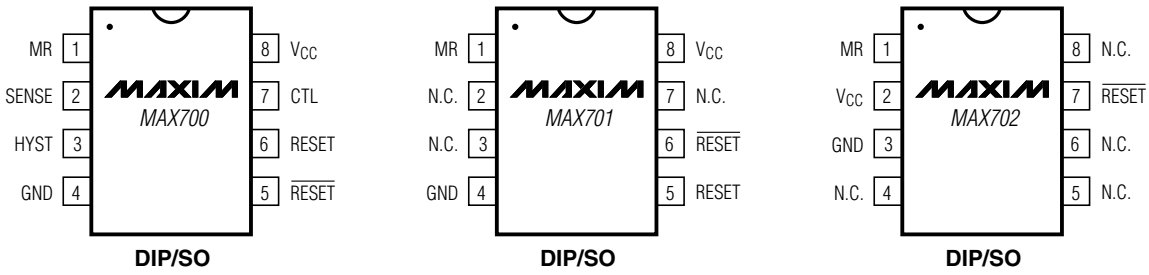
Ordering Information

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

**Devices in PDIP and SO packages are available in both leaded and lead-free packaging. Specify lead free by adding the + symbol at the end of the part number when ordering.*

Pin Configurations

TOP VIEW



Power-Supply Monitor with Reset

ABSOLUTE MAXIMUM RATINGS

V_{CC} .....-0.3V to +15.5V
Voltage (with respect to GND) at RESET, $\overline{RESET}$,
HYST, CTL, SENSE .....-0.3V to V_{CC}
Operating Temperature Range
C Suffix .....0°C to +70°C
E Suffix.....-40°C to +85°C

Rate of Rise, V_{CC} 100V/µs
Power Dissipation, Any Package 380mW
Storage Temperature Range .....-55°C to +150°C
Lead Temperature (soldering, 10s).....+300°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 device reliability.

ELECTRICAL CHARACTERISTICS

(V_{CC} = +5V, CTL = GND on MAX700, T_A = +25°C, unless otherwise noted.)

PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
V_{CC} Monitor Voltage Range (MAX700 Only)	$T_A = T_{MIN}$ to T_{MAX}, CTL = V_{CC}		3		15	V
Min V_{CC} for Valid Reset Output, Declining Supply	$T_A = T_{MIN}$ to T_{MAX}, $\overline{RESET}$ ≤ 0.4V when sinking 1mA		1.5	1		V
Supply Current				100	200	µA
Reset Threshold	$T_A = T_{MIN}$ to T_{MAX}	Power-up	4.50	4.65	4.75	V
		Power-down	4.50	4.62	4.75	
Internal Hysteresis	HYST not connected			30		mV
Reset Output Pulse Width			200	350	500	ms
RESET Fall Time	MAX700/MAX701 only, C_{LOAD} = 100pF			200		ns
V_{CC} Pulse Duration Guaranteeing	5V to 4V V_{CC} pulse	No reset		10	1	µs
		Reset	100	10		
MR Input Threshold				0.7		V
MR Pullup Current				-5	-30	µA
MAX700						
RESET Output Low	I_{SINK} = 3.2mA, V_{CC} = 5V				0.4	V
	I_{SINK} = 1.6mA, V_{CC} = 3V				0.4	
RESET Output High	I_{SOURCE} = 3.2mA, V_{CC} = 4.25V		V_{CC} - 0.4			V
	I_{SOURCE} = 1.6mA, V_{CC} = 3V		V_{CC} - 0.4			
	I_{SOURCE} = 0.5mA, V_{CC} = 1.5V		V_{CC} - 0.4			
$\overline{RESET}$ Output Low	I_{SINK} = 16mA, V_{CC} = 4.25V				0.4	V
	I_{SINK} = 1.6mA, V_{CC} = 3V				0.4	
	I_{SINK} = 0.4mA, V_{CC} = 1.5V				0.4	
$\overline{RESET}$ Output High	I_{SOURCE} = 3.2mA, V_{CC} = 5V		V_{CC} - 0.4			V
	I_{SOURCE} = 1.6mA, V_{CC} = 3V		V_{CC} - 0.4			

ELECTRICAL CHARACTERISTICS (continued)

(V_{CC} = +5V, CTL = GND on MAX700, T_A = +25°C, unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
MAX701					
RESET Output Low	I_{SINK} = 16mA, V_{CC} = 5V			0.4	V
RESET Output High	I_{SOURCE} = 3.2mA, V_{CC} = 4.25V	V_{CC} - 0.4			V
	I_{SOURCE} = 1.6mA, V_{CC} = 3V	V_{CC} - 0.4			
	I_{SOURCE} = 0.5mA, V_{CC} = 1.5V	V_{CC} - 0.4			
$\overline{RESET}$ Output Low	I_{SINK} = 3.2mA, V_{CC} = 4.25V			0.4	V
	I_{SINK} = 1.6mA, V_{CC} = 3V			0.4	
	I_{SINK} = 0.4mA, V_{CC} = 1.5V			0.4	
$\overline{RESET}$ Output High	I_{SOURCE} = 3.2mA, V_{CC} = 5V	V_{CC} - 0.4			V
MAX702					
$\overline{RESET}$ Output Low	I_{SINK} = 3.2mA, V_{CC} = 4.25V			0.4	V
	I_{SINK} = 1.6mA, V_{CC} = 3V			0.4	
	I_{SINK} = 0.4mA, V_{CC} = 1.5V			0.4	
$\overline{RESET}$ Output High	I_{SOURCE} = 3.2mA, V_{CC} = 5V	V_{CC} - 0.4			V
MAX700 ONLY (CTL = V_{CC}, unless otherwise noted)					
SENSE Input Threshold	T_A = T_{MIN} to T_{MAX}	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

Power-Supply Monitor with Reset

Pin Description

PIN			NAME	FUNCTION
MAX700	MAX701	MAX702		
1	1	1	MR	Input for Manual Pushbutton Reset. Has internal 5µA pullup. Low input activates the RESET/$\overline{\text{RESET}}$ outputs.
2	—	—	SENSE	The voltage-sense input when CTL = V_{CC}. Its threshold is 1.29V. SENSE always remains connected to the internal comparator. So, when V_{CC} is being monitored internally (CTL = GND), SENSE should be left open circuit.
3	—	—	HYST	Normally NOT used when voltage is monitored through V_{CC} (CTL = GND). When monitoring through SENSE (CTL = V_{CC}), HYST allows hysteresis to be added, reducing noise and spurious reset activity (Figure 3). HYST turns on 5µs before the RESET/$\overline{\text{RESET}}$ outputs are activated, and its on-resistance to GND is typically 1kΩ.
4	4	3	GND	Ground
5	6	7	$\overline{\text{RESET}}$	Goes low when V_{CC} falls below 4.65V, or when CTL = V_{CC} on the MAX700 goes low when SENSE falls below 1.29V.
6	5	—	RESET	Inverted Version of $\overline{\text{RESET}}$
7	—	—	CTL	When CTL = GND, V_{CC} is monitored by the reset circuit. When CTL = V_{CC}, V_{CC} is ignored and SENSE is monitored, allowing the threshold to be set with external resistors.
8	8	2	V_{CC}	Chip Power and +5V Sensing Input (When CTL = GND on MAX700)
—	2, 3, 7	4, 5, 6, 8	N.C.	No Connection

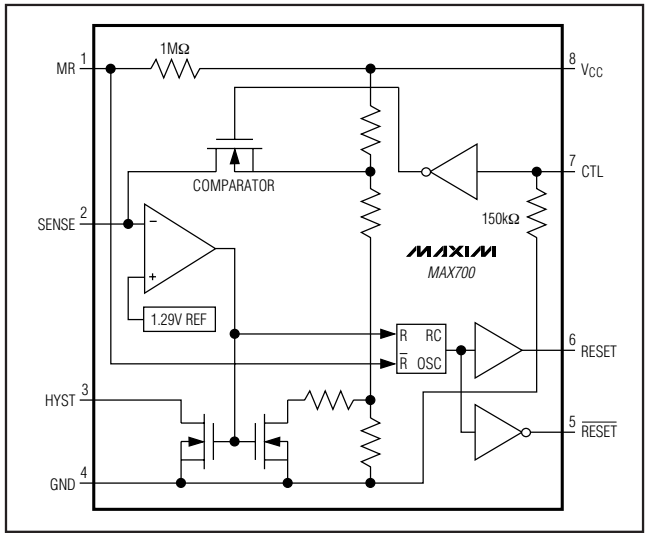


Figure 1. MAX700 Block Diagram

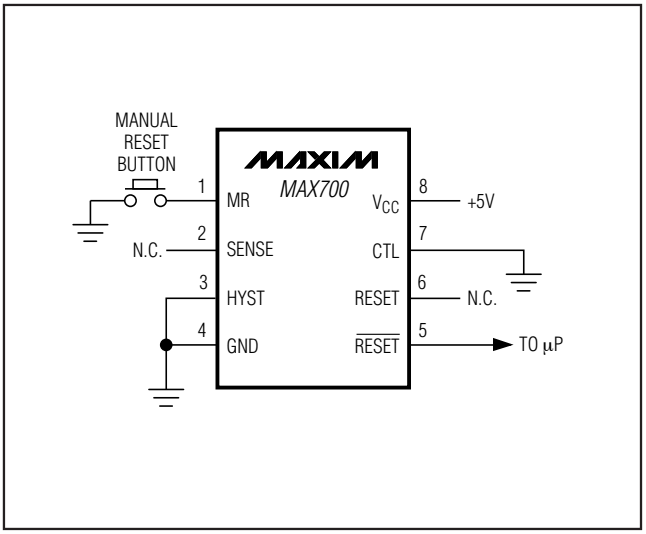


Figure 2. MAX700 Typical Connection Diagram

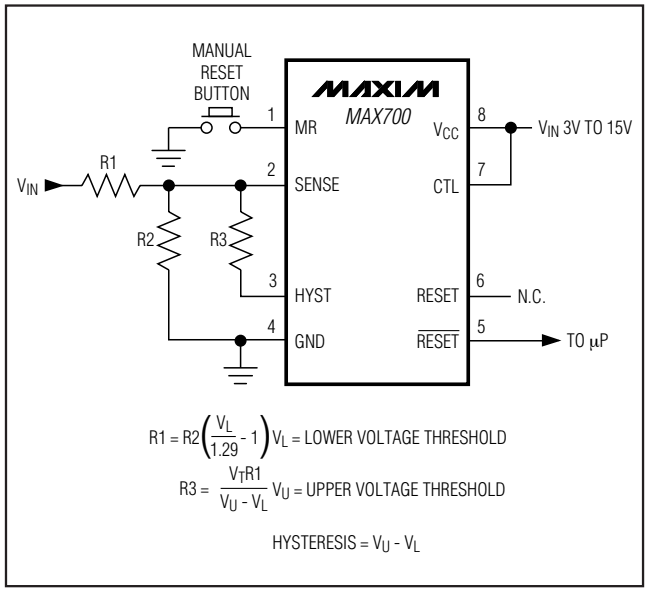


Figure 3. MAX700 Connected for External Senses and Hysteresis

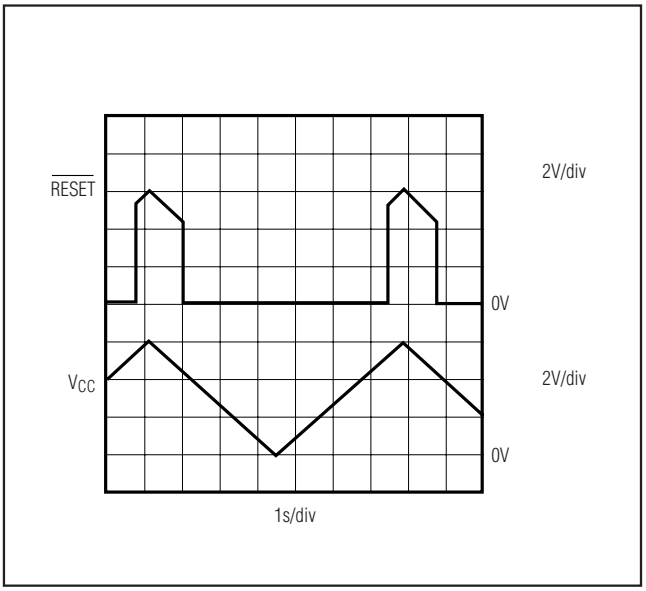


Figure 4. Typical MAX700/MAX701/MAX702 RESET Output vs. V_{CC}

Figure 4 shows the $\overline{RESET}$ output of the MAX700/MAX701/MAX702 in the correct state for V_{CC} voltages down to 0V. Note the effect of the built-in hysteresis on the trigger lever of $\overline{RESET}$.

Package Information

For the latest package outline information, go to **www.maxim-ic.com/packages**.

Power-Supply Monitor with Reset

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	3/90	Initial release	—
1	11/05	Added lead-free information to the *Ordering Information* table.	1
2	12/07	Updated *Pin Description* table.	4