

●新特器件应用

微处理器监控器 MAX813L

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摘要: MAX813L 是美国 MAXIM 公司生产的微处理器专用监控器, 具有看门狗、电压检测和上电复位等功能, 可提高系统的可靠性和准确性。本文介绍该芯片的内部结构、典型应用和作为单片机看门狗电路的实用电路。

关键词: 监控电路 看门狗电路 MAX813L 复位 电压检测

1、概述

目前, 监控电路在工业监控系统和微处理器中已得到广泛的应用, 它可以有效的防止程序的“跑飞”, 并自动将系统恢复正常工作状态。当外来干扰导致数据总线、I/O 总线或控制总线上的数字信号错乱时, 将引发一系列的后果, 特别是程序指针计数器 PC 值受干扰而改变时, 将引起程序“跑飞”, 使系统出现死机或其他一些不可预知的情况。

2、内部结构

MAX813L 是美国 MAXIM 公司生产的低价格单片机监控电路。它减少了在微处

理器系统中采用分离元件来实现监控功能所用的元器件数量和复杂性, 并能提高系统的可靠性和准确性。它除有看门狗作用以外, 还有电源电压检测和上电(手动)复位的功能。

图 1 是 MAX813L 的内部框图。PEI 用于监测电源电压, 如果 PFI 端输入的正电压低于 1.25V, 则 PFO 端输出为低电平, 这个负脉冲可以作为微处理器的中断脉冲。看门狗电路监测着微处理器的状态。如果微处理器在 1.6 秒之内没有触发看门狗输入端 WDI 并且 WDI 端不是处于三态状态, 那么 WDO 将变为低电平。一旦 RESET 信号产生或者 WDI 输入为三态, 看门狗定时器就会被清零且不计数。除非 RESET 信号消失而且 WDI 端置为高电平或者低电平(即不是处于高阻状态), 看门狗定时器又将开始计数。

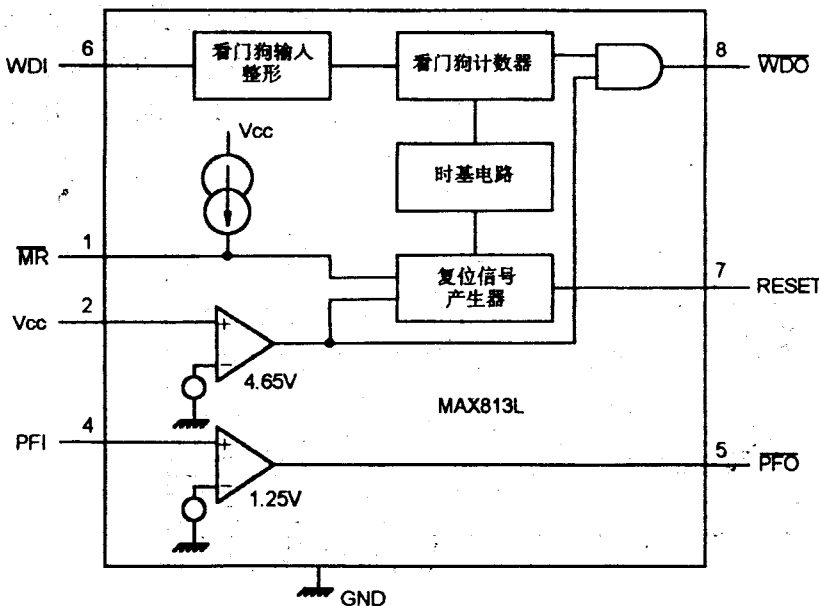


图 1 MAX813L 内部框图

3、MAX813L 实用实例

典型的接法如图 3。将 WDO 接到微处理器的非屏蔽中断输入端 NMI, 当电源电压 V_{CC} 低于复位的门限电平时, 无论看门狗计数器计数值是否到; WDO 端都将被拉至低电平, 产生非屏蔽中断, 同时 RESET 信号也同时产

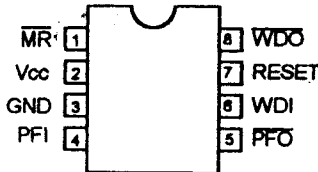


图 2 MAX813L 封装及管脚分布图

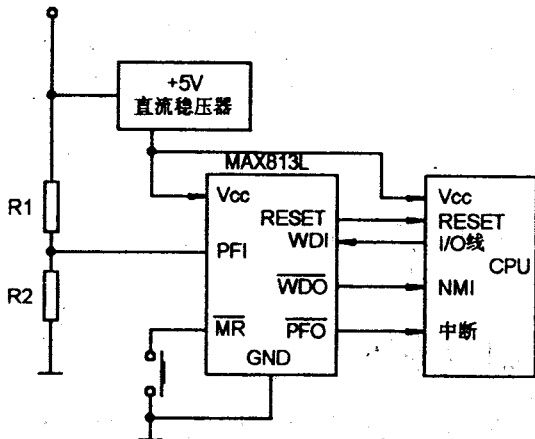


图 3 MAX813L 的典型应用

生, 因此, 非屏蔽中断将会被 RESET 信号所覆盖。

手动操作 MR 端允许通过手动按钮开关产生一个负脉冲去触发复位信号产生器产生复位信号 RESET。MR 端对 TTL/CMOS 兼容, 因此, 它可以由外部的逻辑电路去驱动。在 MAX813L 中, 可以利用 MR 接到看门狗定时器的输出脉冲端来产生复位脉冲, 因此只要将 MR 和 WDO 简单的接在一起即可。当微处理器经过 1.6 秒仍然没有二次触发看门狗输入端 WDI, 那么, WDO 就会输出一个负脉冲, 这个负脉冲作用于 MR 端, 通过复位信号产生器强制产生 RESET 信号。

由 MAX813L 构成的看门狗电路如图 4 所示。图中, 电阻 R1 和 R2 分压产生 1.25V 电源门限值。当此脚的电压低于 1.25V 时, 即电源电压低于额定值时, PFO 将产生一个脉冲信号, 可以用于向 CPU 发出中断, 使 CPU 完成应急处理。此功能可以完成电源电压的监测。在软件的编制中, 每次程序的循环通过对 P1.0 的位操作向 MAX813L 的看门狗输入端输入一个负脉冲。如果程序出现“跑飞”现象, 程序将不能正常运行, 这个定时

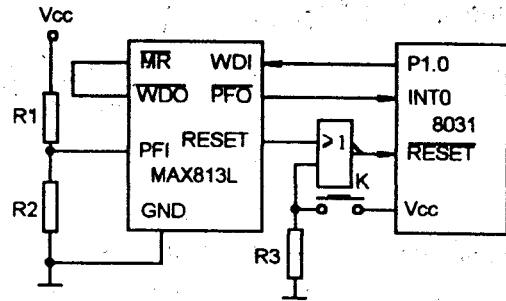


图 4 MAX813L 用作看门狗电路

发出的脉冲也得不到保障。当单片机超过 1.6 秒未向 MAX813L 的看门狗输入端发脉冲信号, MAX813L 内部的定时器将会强制将 WDO 拉到低电平, 这个低电平通过 MR 产生复位信号。单片机复位后从初始状态开始运行, 从而保证系统的可靠性, 起到了看门狗的作用。

本设计已应用于实际的工控系统中, 经过测试表明效果较好, 是一种理想的监控电路。

参考文献

1. MAXIM 1995 年新产品数据手册 第四卷
2. 陈伟人, 单片微型计算机原理机器应用, 清华大学出版社, 1989

咨询编号: 970607

交流步进电子模块简介

交流步进电子模块可直接和三相异步电动机、单相交流电源连接, 变三相异步电动机为单相交流步进电动机, 使转速降低在 1000 转以内, 可代替一级或二级传动。

该模块采用脉冲数字信号进行起动、停止、反转等控制, 具有调功、调速、定位、延时、定时和过载保护等功能。

该模块集接触器、继电器、热继电器、时间继电器、可编程控制器等控制电器的功能于一身, 其控制信号与微机或传感器信号兼容。因此可根据人们的不同需要, 采用编写程序设计所需要的控制及功能, 并将程序固化在电子模块内, 以实现自动化控制和开发机电一体化新产品。

该模块制作简单、可靠性高、容易开发、用途广泛, 成本只有 100 元至 1000 元左右, 三相异步电动机功率为几瓦至 7.5 千瓦之间。

注: 该模块正在申请专利权, 愿作技术转让。
联系地址: 甘肃省永登县中华街 37 号永登粮机厂 (730300), 联系人: 罗国强。



Low-Cost, μ P Supervisory Circuits

MAX705-MAX708/MAX813L

General Description

The MAX705-MAX708/MAX813L microprocessor (μ P) supervisory circuits reduce the complexity and number of components required to monitor power-supply and battery functions in μ P systems. These devices significantly improve system reliability and accuracy compared to separate ICs or discrete components.

The MAX705/MAX706/MAX813L provide four functions:

- 1) A reset output during power-up, power-down, and brownout conditions.
- 2) An independent watchdog output that goes low if the watchdog input has not been toggled within 1.6 seconds.
- 3) A 1.25V threshold detector for power-fail warning, low-battery detection, or for monitoring a power supply other than +5V.
- 4) An active-low manual-reset input.

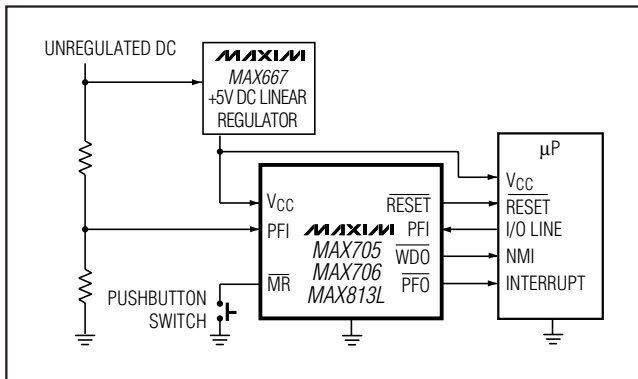
The MAX707/MAX708 are the same as the MAX705/MAX706, except an active-high reset is substituted for the watchdog timer. The MAX813L is the same as the MAX705, except RESET is provided instead of $\overline{\text{RESET}}$.

Two supply-voltage monitor levels are available: The MAX705/MAX707/MAX813L generate a reset pulse when the supply voltage drops below 4.65V, while the MAX706/MAX708 generate a reset pulse below 4.40V. All four parts are available in 8-pin DIP, SO and μ MAX packages.

Applications

- Computers
- Controllers
- Intelligent Instruments
- Automotive Systems
- Critical μ P Power Monitoring

Typical Operating Circuit



Features

- ◆ μ MAX Package: Smallest 8-Pin SO
- ◆ Guaranteed $\overline{\text{RESET}}$ Valid at $V_{CC} = 1V$
- ◆ Precision Supply-Voltage Monitor
4.65V in MAX705/MAX707/MAX813L
4.40V in MAX706/MAX708
- ◆ 200ms Reset Pulse Width
- ◆ Debounced TTL/CMOS-Compatible Manual-Reset Input
- ◆ Independent Watchdog Timer—1.6sec Timeout (MAX705/MAX706)
- ◆ Active-High Reset Output (MAX707/MAX708/MAX813L)
- ◆ Voltage Monitor for Power-Fail or Low-Battery Warning

Ordering Information

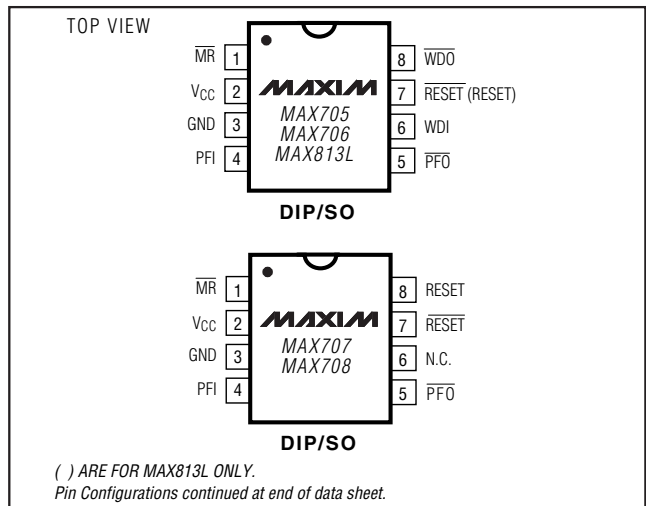
PART	TEMP RANGE	PIN-PACKAGE
MAX705CPA	0°C to +70°C	8 Plastic DIP
MAX705CSA	0°C to +70°C	8 SO
MAX705CUA	0°C to +70°C	8 μ MAX
MAX705C/D	0°C to +70°C	Dice*

Ordering Information continued at end of data sheet.

* Dice are specified at $T_A = +25^\circ\text{C}$.

** Contact factory for availability and processing to MIL-STD-883. Devices in PDIP, SO and μ MAX 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. Lead free not available for CERDIP package.

Pin Configurations



Low-Cost, μ P Supervisory Circuits

ABSOLUTE MAXIMUM RATINGS

Terminal Voltage (with respect to GND)		SO (derate 5.88mW/°C above +70°C)	471mW
V_{CC}	-0.3V to 6.0V	μ MAX (derate 4.10mW/°C above +70°C)	330mW
All Other Inputs (Note 1)	-0.3V to (V_{CC} + 0.3V)	CERDIP (derate 8.00mW/°C above +70°C)	640mW
Input Current		Operating Temperature Ranges	
V_{CC}	20mA	MAX70_C_, MAX813LC_	0°C to +70°C
GND	20mA	MAX70_E_, MAX813LE_	-40°C to +85°C
Output Current (all outputs)	20mA	MAX70_MJA	-55°C to +125°C
Continuous Power Dissipation		Storage Temperature Range	-65°C to +160°C
Plastic DIP (derate 9.09mW/°C above +70°C)	727mW	Lead Temperature (soldering, 10sec)	+300°C

Note 1: The input voltage limits on PFI and \overline{MR} can be exceeded if the input current is less than 10mA.

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} = 4.75V to 5.5V for MAX705/MAX707/MAX813L, V_{CC} = 4.5V to 5.5V for MAX706/MAX708, T_A = T_{MIN} to T_{MAX} , unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	
Operating Voltage Range	V_{CC}	MAX70_C	1.0		5.5	V	
		MAX813LC	1.1		5.5		
		MAX70_E/M, MAX813LE/M	1.2		5.5		
Supply Current	I_{SUPPLY}	MAX705C, MAX706C, MAX813LC		150	350	μ A	
		MAX705E/M, MAX706E/M, MAX813LE/M		150	500		
		MAX707C, MAX708C		50	350		
		MAX707E/M, MAX708E/M		50	500		
Reset Threshold (Note 2)	V_{RT}	MAX705, MAX707, MAX813L	4.50	4.65	4.75	V	
		MAX706, MAX708	4.25	4.40	4.50		
Reset Threshold Hysteresis (Note 2)				40		mV	
Reset Pulse Width (Note 2)	t_{RS}		140	200	280	ms	
\overline{RESET} Output Voltage		$I_{SOURCE} = 800\mu A$	$V_{CC} - 1.5$			V	
		$I_{SINK} = 3.2mA$	0.4				
		MAX70_C, $V_{CC} = 1V$, $I_{SINK} = 50\mu A$	0.3				
		MAX70_E/M, $V_{CC} = 1.2V$, $I_{SINK} = 100\mu A$	0.3				
RESET Output Voltage		MAX707, MAX708, $I_{SOURCE} = 800\mu A$	$V_{CC} - 1.5$			V	
		MAX707, MAX708, $I_{SINK} = 1.2mA$	0.4				
		MAX813LC, $I_{SOURCE} = 4\mu A$, $V_{CC} = 1.1V$	0.8				
		MAX813LE/M, $I_{SOURCE} = 4\mu A$, $V_{CC} = 1.2V$	0.9				
		MAX813L	$I_{SOURCE} = 800\mu A$	$V_{CC} - 1.5$			
			$I_{SINK} = 3.2mA$	0.4			
Watchdog Timeout Period	t_{WD}	MAX705, MAX706, MAX813L	1.00	1.60	2.25	sec	
WDI Pulse Width	t_{WP}	$V_{IL} = 0.4V$, $V_{IH} = (V_{CC}) (0.8)$	50			ns	
WDI Input Threshold	Low	MAX705, MAX706, MAX813L, $V_{CC} = 5V$	0.8			V	
	High		3.5				
WDI Input Current		MAX705, MAX706, MAX813L, WDI = V_{CC}	50		150	μ A	
		MAX705, MAX706, MAX813L, WDI = 0V	-150	-50			
\overline{WDO} Output Voltage		MAX705, MAX706, MAX813L, $I_{SOURCE} = 800\mu A$	$V_{CC} - 1.5$			V	
		MAX705, MAX706, MAX813L, $I_{SINK} = 1.2mA$	0.4				

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ELECTRICAL CHARACTERISTICS (continued)

($V_{CC} = 4.75V$ to $5.5V$ for MAX705/MAX707/MAX813L, $V_{CC} = 4.5V$ to $5.5V$ for MAX706/MAX708, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
\overline{MR} Pull-Up Current		$\overline{MR} = 0V$	100	250	600	μA
\overline{MR} Pulse Width	t_{MR}		150			ns
\overline{MR} Input Threshold	Low				0.8	V
	High		2.0			
\overline{MR} to Reset Out Delay (Note 2)	t_{MD}				250	ns
PFI Input Threshold		$V_{CC} = 5V$	1.20	1.25	1.30	V
PFI Input Current			-25.00	0.01	25.00	nA
\overline{PFO} Output Voltage		$I_{SOURCE} = 800\mu A$	$V_{CC} - 1.5$			V
		$I_{SINK} = 3.2mA$	0.4			

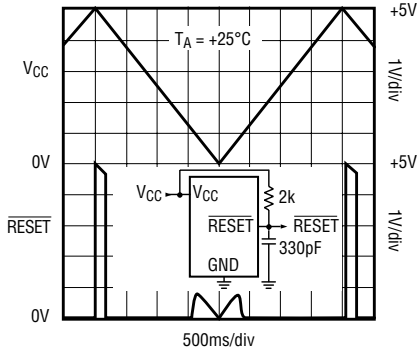
Note 2: Applies to both \overline{RESET} in the MAX705-MAX708 and \overline{RESET} in the MAX707/MAX708/MAX813L.

MAX705-MAX708/MAX813L

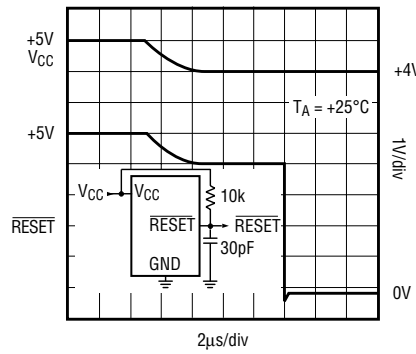
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Typical Operating Characteristics

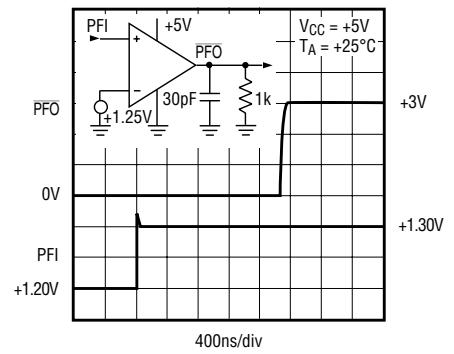
**MAX705/MAX707
RESET OUTPUT VOLTAGE
vs. SUPPLY VOLTAGE**



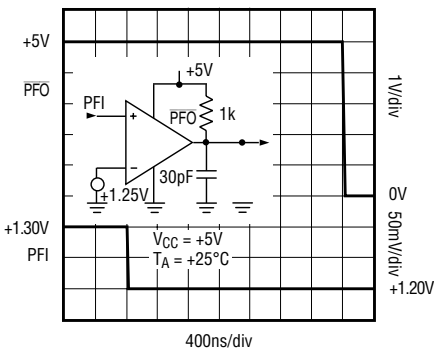
**MAX705/MAX707
RESET RESPONSE TIME**



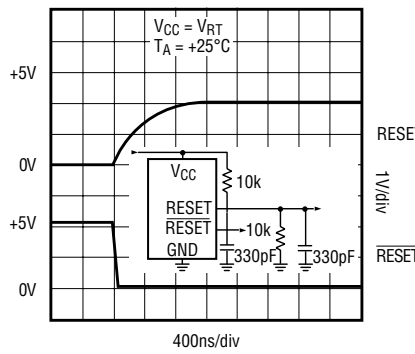
**POWER-FAIL COMPARATOR
DE-ASSERTION RESPONSE TIME**



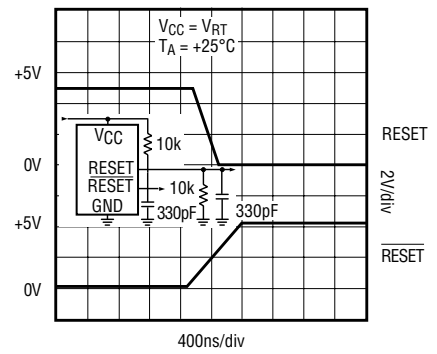
**POWER-FAIL COMPARATOR
ASSERTION RESPONSE TIME**



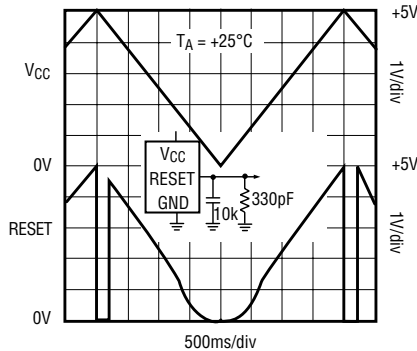
**MAX707
RESET, RESET ASSERTION**



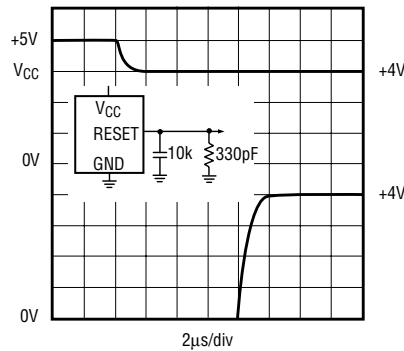
**MAX707
RESET, RESET DE-ASSERTION**



**MAX707/MAX708/MAX813L
RESET OUTPUT VOLTAGE
vs. SUPPLY VOLTAGE**



**MAX813L
RESET RESPONSE TIME**



Low-Cost, μ P Supervisory Circuits

Pin Description

MAX705-MAX708/MAX813L

PIN						NAME	FUNCTION
MAX705/MAX706		MAX707/MAX708		MAX813L			
DIP/SO	μ MAX	DIP/SO	μ MAX	DIP/SO	μ MAX		
1	3	1	3	1	3	\overline{MR}	Manual-Reset Input triggers a reset pulse when pulled below 0.8V. This active-low input has an internal 250 μ A pull-up current. It can be driven from a TTL or CMOS logic line as well as shorted to ground with a switch.
2	4	2	4	2	4	V_{CC}	+5V Supply Input
3	5	3	5	3	5	GND	0V Ground Reference for all signals
4	6	4	6	4	6	PFI	Power-Fail Voltage Monitor Input. When PFI is less than 1.25V, \overline{PFO} goes low. Connect PFI to GND or V_{CC} when not used.
5	7	5	7	5	7	\overline{PFO}	Power-Fail Output goes low and sinks current when PFI is less than 1.25V; otherwise \overline{PFO} stays high.
6	8	-	-	6	8	WDI	Watchdog Input. If WDI remains high or low for 1.6sec, the internal watchdog timer runs out and WDO goes low (Figure 1). Floating WDI or connecting WDI to a high-impedance three-state buffer disables the watchdog feature. The internal watchdog timer clears whenever reset is asserted, WDI is three-stated, or WDI sees a rising or falling edge.
-	-	6	-	-	-	N.C.	No Connect
7	1	7	1	-	-	\overline{RESET}	Active-Low Reset Output pulses low for 200ms when triggered, and stays low whenever V_{CC} is below the reset threshold (4.65V in the MAX705 and 4.40V in the MAX706). It remains low for 200ms after V_{CC} rises above the reset threshold or \overline{MR} goes from low to high (Figure 3). A watchdog timeout will not trigger \overline{RESET} unless \overline{WDO} is connected to \overline{MR} .
8	2	-	-	8	2	\overline{WDO}	Watchdog Output pulls low when the internal watchdog timer finishes its 1.6sec count and does not go high again until the watchdog is cleared. \overline{WDO} also goes low during low-line conditions. Whenever V_{CC} is below the reset threshold, \overline{WDO} stays low; however, unlike \overline{RESET} , \overline{WDO} does not have a minimum pulse width. As soon as V_{CC} rises above the reset threshold, \overline{WDO} goes high with no delay.
-	-	8	2	7	1	RESET	Active-High Reset Output is the inverse of \overline{RESET} . Whenever \overline{RESET} is high, RESET is low, and vice versa (Figure 2). The MAX813L has a RESET output only.

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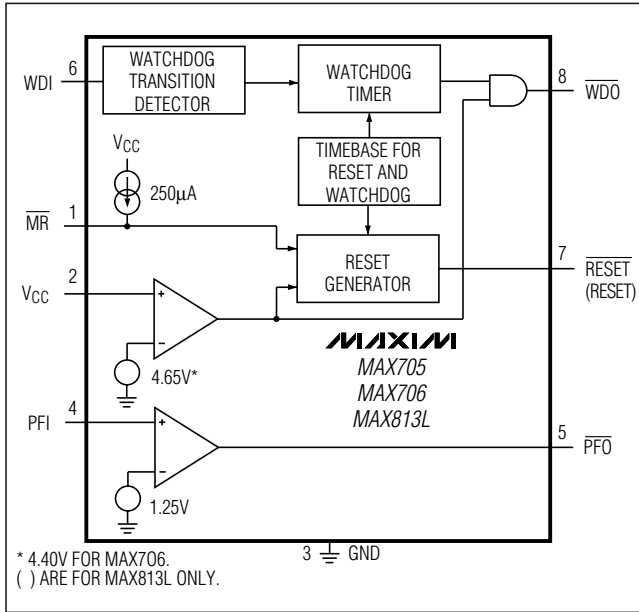


Figure 1. MAX705/MAX706/MAX813L Block Diagram

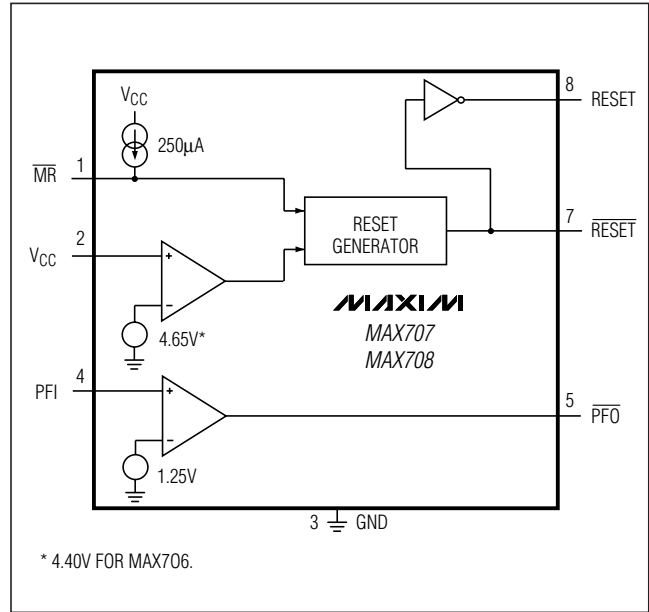


Figure 2. MAX707/MAX708 Block Diagram

Detailed Description

Reset Output

A microprocessor's (μ P's) reset input starts the μ P in a known state. Whenever the μ P is in an unknown state, it should be held in reset. The MAX705-MAX708/MAX813L assert reset during power-up and prevent code execution errors during power-down or brownout conditions.

On power-up, once V_{CC} reaches 1V, $\overline{\text{RESET}}$ is a guaranteed logic low of 0.4V or less. As V_{CC} rises, $\overline{\text{RESET}}$ stays low. When V_{CC} rises above the reset threshold, an internal timer releases $\overline{\text{RESET}}$ after about 200ms. $\overline{\text{RESET}}$ pulses low whenever V_{CC} dips below the reset threshold, i.e. brownout condition. If brownout occurs in the middle of a previously initiated reset pulse, the pulse continues for at least another 140ms. On power-down, once V_{CC} falls below the reset threshold, $\overline{\text{RESET}}$ stays low and is guaranteed to be 0.4V or less until V_{CC} drops below 1V.

The MAX707/MAX708/MAX813L active-high RESET output is simply the complement of the $\overline{\text{RESET}}$ output, and is guaranteed to be valid with V_{CC} down to 1.1V. Some μ Ps, such as Intel's 80C51, require an active-high reset pulse.

Watchdog Timer

The MAX705/MAX706/MAX813L watchdog circuit monitors the μ P's activity. If the μ P does not toggle the watchdog input (WDI) within 1.6sec and WDI is not three-stated, $\overline{\text{WDO}}$ goes low. As long as $\overline{\text{RESET}}$ is asserted or the

WDI input is three-stated, the watchdog timer will stay cleared and will not count. As soon as reset is released and WDI is driven high or low, the timer will start counting. Pulses as short as 50ns can be detected.

Typically, $\overline{\text{WDO}}$ will be connected to the non-maskable interrupt input (NMI) of a μ P. When V_{CC} drops below the reset threshold, $\overline{\text{WDO}}$ will go low whether or not the watchdog timer has timed out yet. Normally this would trigger an NMI interrupt, but $\overline{\text{RESET}}$ goes low simultaneously, and thus overrides the NMI interrupt.

If WDI is left unconnected, $\overline{\text{WDO}}$ can be used as a low-line output. Since floating WDI disables the internal timer, $\overline{\text{WDO}}$ goes low only when V_{CC} falls below the reset threshold, thus functioning as a low-line output.

The MAX705/MAX706 have a watchdog timer and a $\overline{\text{RESET}}$ output. The MAX707/MAX708 have both active-high and active-low reset outputs. The MAX813L has both an active-high reset output and a watchdog timer.

Manual Reset

The manual-reset input ($\overline{\text{MR}}$) allows reset to be triggered by a pushbutton switch. The switch is effectively debounced by the 140ms minimum reset pulse width. $\overline{\text{MR}}$ is TTL/CMOS logic compatible, so it can be driven by an external logic line. $\overline{\text{MR}}$ can be used to force a watchdog timeout to generate a reset pulse in the MAX705/MAX706/MAX813L. Simply connect $\overline{\text{WDO}}$ to $\overline{\text{MR}}$.

Low-Cost, μP Supervisory Circuits

MAX705-MAX708/MAX813L

Power-Fail Comparator

The power-fail comparator can be used for various purposes because its output and noninverting input are not internally connected. The inverting input is internally connected to a 1.25V reference.

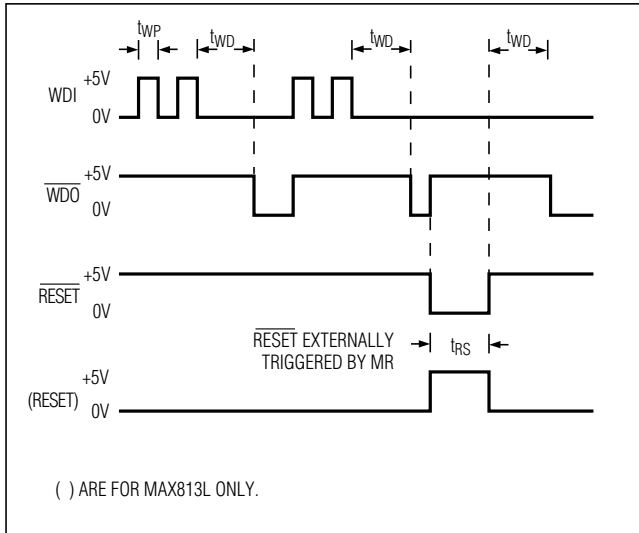


Figure 3. MAX705/MAX706/MAX813L Watchdog Timing

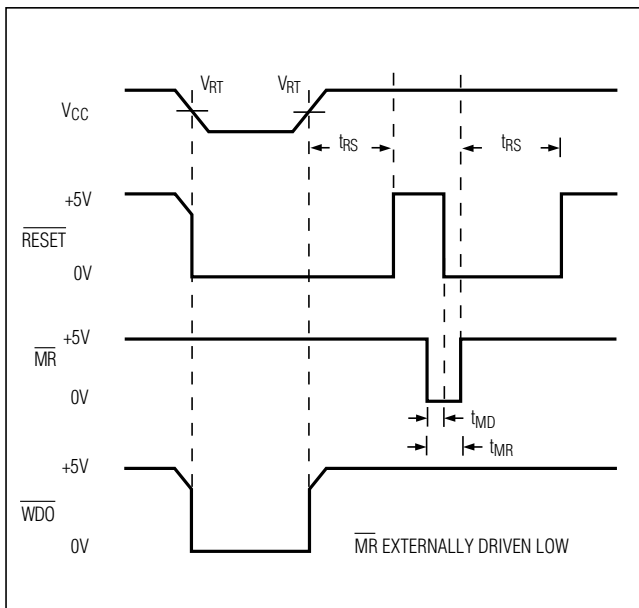


Figure 4. MAX705/MAX706 $\overline{\text{RESET}}$, $\overline{\text{MR}}$, and $\overline{\text{WDO}}$ Timing with WDI Three-Stated. The MAX707/MAX708/MAX813L $\overline{\text{RESET}}$ output is the inverse of $\overline{\text{RESET}}$ shown.

To build an early-warning circuit for power failure, connect the PFI pin to a voltage divider (see *Typical Operating Circuit*). Choose the voltage divider ratio so that the voltage at PFI falls below 1.25V just before the +5V regulator drops out. Use $\overline{\text{PFO}}$ to interrupt the μP so it can prepare for an orderly power-down.

Applications Information

Ensuring a Valid $\overline{\text{RESET}}$ Output Down to $V_{\text{CC}} = 0\text{V}$

When V_{CC} falls below 1V, the MAX705-MAX708 $\overline{\text{RESET}}$ output no longer sinks current—it becomes an open circuit. High-impedance CMOS logic inputs can drift to undetermined voltages if left undriven. If a pull-down resistor is added to the $\overline{\text{RESET}}$ pin as shown in Figure 5, any stray charge or leakage currents will be drained to ground, holding $\overline{\text{RESET}}$ low. Resistor value (R_1) is not critical. It should be about 100k Ω , large enough not to load $\overline{\text{RESET}}$ and small enough to pull $\overline{\text{RESET}}$ to ground.

Monitoring Voltages Other Than the Unregulated DC Input

Monitor voltages other than the unregulated DC by connecting a voltage divider to PFI and adjusting the ratio appropriately. If required, add hysteresis by connecting a resistor (with a value approximately 10 times the sum of the two resistors in the potential divider network) between PFI and $\overline{\text{PFO}}$. A capacitor between PFI and GND will reduce the power-fail circuit's sensitivity to high-frequency noise on the line being monitored. $\overline{\text{RESET}}$ can be asserted on other voltages in addition to the +5V V_{CC} line. Connect $\overline{\text{PFO}}$ to $\overline{\text{MR}}$ to initiate a $\overline{\text{RESET}}$ pulse when PFI drops below 1.25V. Figure 6 shows the MAX705-MAX708 configured to assert $\overline{\text{RESET}}$ when the +5V supply falls below the reset threshold, or when the +12V supply falls below approximately 11V.

Monitoring a Negative Voltage

The power-fail comparator can also monitor a negative supply rail (Figure 7). When the negative rail is good (a negative voltage of large magnitude), $\overline{\text{PFO}}$ is low, and when the negative rail is degraded (a negative voltage of lesser magnitude), $\overline{\text{PFO}}$ is high. By adding the resistors and transistor as shown, a high $\overline{\text{PFO}}$ triggers reset. As long as $\overline{\text{PFO}}$ remains high, the MAX705-MAX708/MAX813L will keep reset asserted ($\overline{\text{RESET}} = \text{low}$, $\text{RESET} = \text{high}$). Note that this circuit's accuracy depends on the PFI threshold tolerance, the V_{CC} line, and the resistors.

Low-Cost, μ P Supervisory Circuits

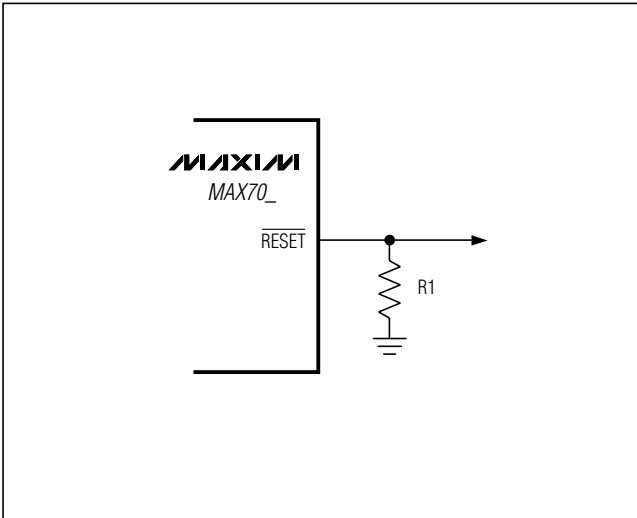


Figure 5. $\overline{\text{RESET}}$ Valid to Ground Circuit

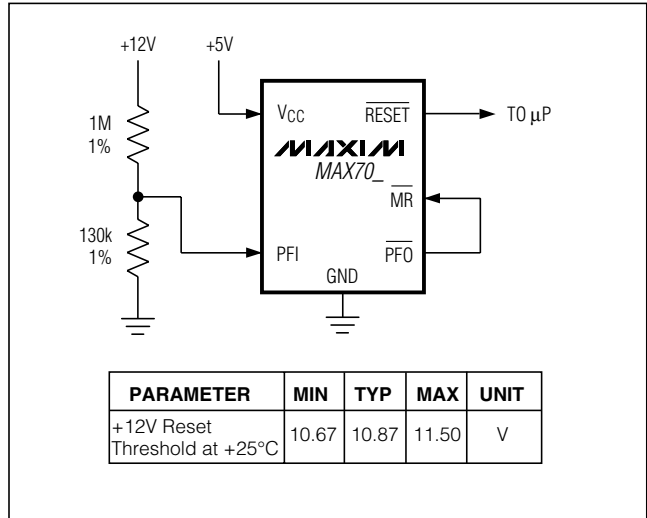


Figure 6. Monitoring Both +5V and +12V

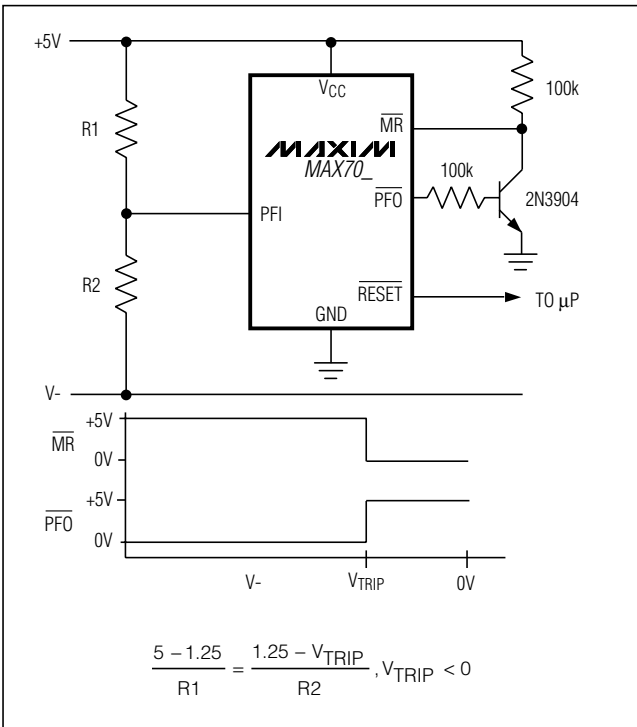


Figure 7. Monitoring a Negative Voltage

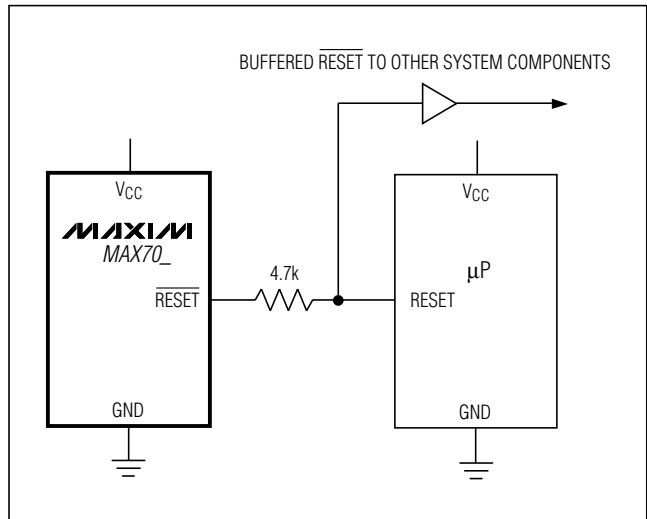


Figure 8. Interfacing to μ Ps with Bidirectional Reset I/O

Interfacing to μ Ps with Bidirectional Reset Pins

μ Ps with bidirectional reset pins, such as the Motorola 68HC11 series, can contend with the MAX705-MAX708 $\overline{\text{RESET}}$ output. If, for example, the $\overline{\text{RESET}}$ output is driven high and the μ P wants to pull it low, indeterminate logic levels may result. To correct this, connect a 4.7k Ω resistor between the $\overline{\text{RESET}}$ output and the μ P reset I/O, as in Figure 8. Buffer the $\overline{\text{RESET}}$ output to other system components.

Low-Cost, μ P Supervisory Circuits

MAX705-MAX708/MAX813L

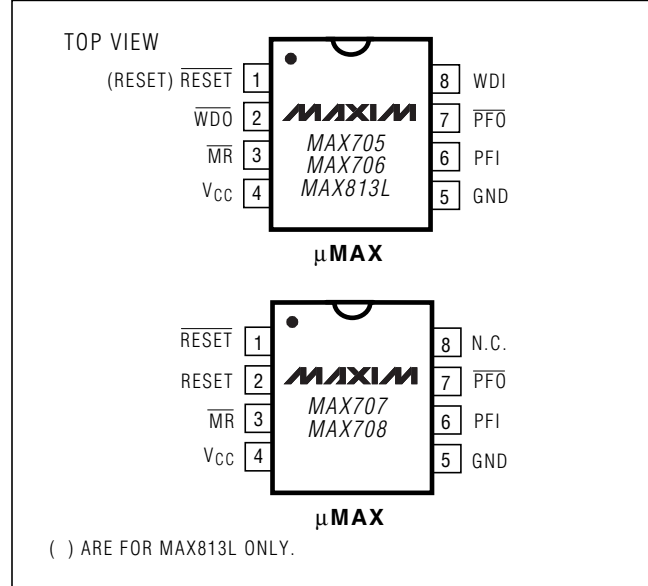
Ordering Information (continued)

PART	TEMP. RANGE	PIN-PACKAGE
MAX705EPA	-40°C to +85°C	8 Plastic DIP
MAX705ESA	-40°C to +85°C	8 SO
MAX705EUA	-40°C to +85°C	8 μ MAX
MAX705MJA	-55°C to +125°C	8 CERDIP**
MAX706CPA	0°C to +70°C	8 Plastic DIP
MAX706CSA	0°C to +70°C	8 SO
MAX706CUA	0°C to +70°C	8 μ MAX
MAX706C/D	0°C to +70°C	Dice*
MAX706EPA	-40°C to +85°C	8 Plastic DIP
MAX706ESA	-40°C to +85°C	8 SO
MAX706EUA	-40°C to +85°C	8 μ MAX
MAX706MJA	-55°C to +125°C	8 CERDIP**
MAX707CPA	0°C to +70°C	8 Plastic DIP
MAX707CSA	0°C to +70°C	8 SO
MAX707CUA	0°C to +70°C	8 μ MAX
MAX707C/D	0°C to +70°C	Dice*
MAX707EPA	-40°C to +85°C	8 Plastic DIP
MAX707ESA	-40°C to +85°C	8 SO
MAX707EUA	-40°C to +85°C	8 μ MAX
MAX707MJA	-55°C to +125°C	8 CERDIP**
MAX708CPA	0°C to +70°C	8 Plastic DIP
MAX708CSA	0°C to +70°C	8 SO
MAX708CUA	0°C to +70°C	8 μ MAX
MAX708C/D	0°C to +70°C	Dice*
MAX708EPA	-40°C to +85°C	8 Plastic DIP
MAX708ESA	-40°C to +85°C	8 SO
MAX708EUA	-40°C to +85°C	8 μ MAX
MAX708MJA	-55°C to +125°C	8 CERDIP**
MAX813LCPA	0°C to +70°C	8 Plastic DIP
MAX813LCSA	0°C to +70°C	8 SO
MAX813LCUA	0°C to +70°C	8 μ MAX
MAX813LC/D	0°C to +70°C	Dice*
MAX813LEPA	-40°C to +85°C	8 Plastic DIP
MAX813LESA	-40°C to +85°C	8 SO
MAX813LEUA	-40°C to +85°C	8 μ MAX
MAX813LMJA	-55°C to +125°C	8 CERDIP**

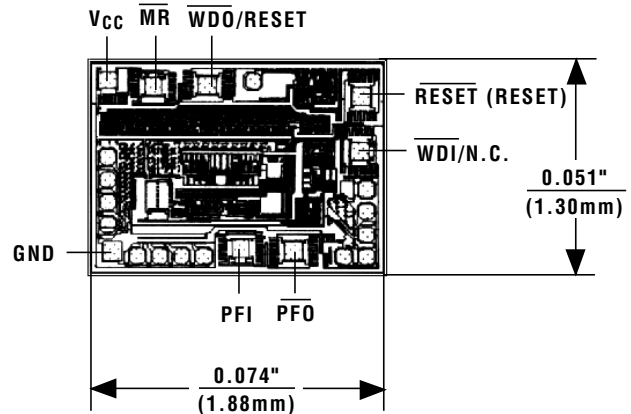
* Dice are specified at $T_A = +25^\circ\text{C}$.

** Contact factory for availability and processing to MIL-STD-883. Devices in PDIP, SO and μ MAX 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. Lead free not available for CERDIP package.

Pin Configuration (continued)



Chip Topography

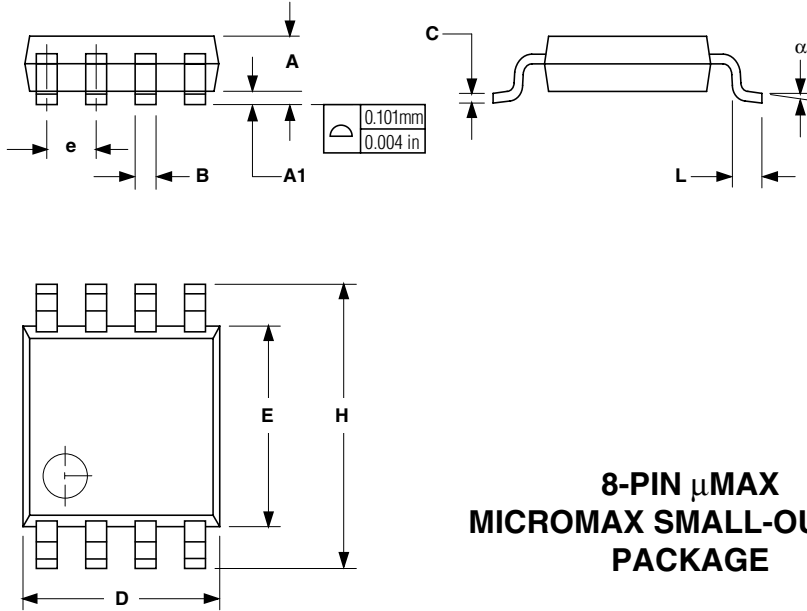


() ARE FOR MAX813L ONLY.
TRANSISTOR COUNT: 572
SUBSTRATE MUST BE LEFT UNCONNECTED.

Low-Cost, μP Supervisory Circuits

Package Information

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information, go to www.maxim-ic.com/packages.)



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.036	0.044	0.91	1.11
A1	0.004	0.008	0.10	0.20
B	0.010	0.014	0.25	0.36
C	0.005	0.007	0.13	0.18
D	0.116	0.120	2.95	3.05
E	0.116	0.120	2.95	3.05
e	0.0256		0.65	
H	0.188	0.198	4.78	5.03
L	0.016	0.026	0.41	0.66
α	0°	6°	0°	6°

21-0036D

**8-PIN μ MAX
MICROMAX SMALL-OUTLINE
PACKAGE**

Low-Cost, μ P Supervisory Circuits

μ P Supervisory Circuits

Part Number	Nominal Reset Threshold (V)	Minimum Reset Pulse Width (ms)	Active-Low Reset	Active-High Reset	RESET Valid to V _{CC} = 1V	Nominal Watchdog Timeout Period (sec), if Available	Separate Watchdog Output	Backup-Battery Switch	V _{CC} -to-V _{OUT} On Resistance Max (Ω)	V _A TT-to-V _{OUT} On Resistance Max (Ω)	CE Write Protect	Power-Fail Comparator	Manual-Reset Input	Low-Line Output	Battery-On Output	SupPLY Operating Mode (mA max (typ))	SupPLY Backup Mode (μA max (typ))	Pins	Price [†] 1000-up (s)
MAX1232	4.37/4.62	250	✓	✓	✓	0.15/0.6/1.2		✓	10	400	✓	✓	✓		✓	0.2(0.05)	5(0.05)	8	1.71
MAX6903/692A	4.65/4.40	140	✓	✓	✓	1.6		✓	10	400	✓	✓	✓		✓	0.35(0.2)	5(0.05)	8	3.26
MAX6904/692ST	2.63/2.93/3.08	140	✓	✓	✓	1.6		✓	6	400	✓	✓	✓		✓	0.5(0.4)	1(0.4)	8	3.23
MAX691A/693A	4.65/4.40	140	✓	✓	✓	1.6/adj.	✓	✓	1.2	25	✓	✓	✓		✓	0.1(0.035)	5(0.04)	16	3.61
MAX1691	The MAX1691 is a module with the MAX691A and a 125mAh lithium battery.																		
MAX696	Adj.	35/adj.	✓	✓	✓	1.6/adj.	✓	✓			✓	✓	✓		✓			16	3.55
MAX697	Adj.	35/adj.	✓	✓	✓	1.6/adj.	✓	✓			✓	✓	✓		✓			16	3.58
MAX700	4.65/adj.	200	✓	✓	✓	1.6/adj.	✓	✓			✓	✓	✓		✓	0.2(0.1)		16	2.17
MAX703/704	4.65/4.40	140	✓	✓	✓	1.6		✓	10	400	✓	✓	✓		✓	0.35(0.2)	5(0.05)	8	1.38*
MAX704/692ST	2.63/2.93/3.08	140	✓	✓	✓	1.6		✓	6	400	✓	✓	✓		✓	0.5(0.4)	1(0.4)	8	2.93
MAX705/706	4.65/4.40	140	✓	✓	✓	1.6		✓			✓	✓	✓		✓	0.35(0.2)		8	1.02*
MAX706P	2.63	140	✓	✓	✓	1.6		✓			✓	✓	✓		✓	0.35(0.2)		8	1.71
MAX706R/ST	2.63/2.93/3.08	140	✓	✓	✓	1.6		✓			✓	✓	✓		✓	0.35(0.2)		8	1.71
MAX707/708	4.65/4.40	140	✓	✓	✓	1.6		✓			✓	✓	✓		✓	0.35(0.2)		8	0.88*
MAX708R/ST	2.63/2.93/3.08	140	✓	✓	✓	1.6		✓			✓	✓	✓		✓	0.35(0.2)		8	1.63
MAX791	4.65	140	✓	✓	✓	1		✓	1.2	25	✓	✓	✓		✓	0.15(0.06)	5(0.04)	16	3.90
MAX792L/M/R/ST	4.65/4.40/	140	✓	✓	✓	1		✓			✓	✓	✓		✓	0.15(0.07)		16	3.42
MAX793R/ST	2.63/2.93/3.08	140	✓	✓	✓	1.6		✓			✓	✓	✓		✓	TBD	TBD	16	††
MAX793R/ST/UT	2.63/2.93/3.08	140	✓	✓	✓	1.6		✓	TBD	TBD	✓	✓	✓		✓	TBD	TBD	16	††
MAX794	Adj.	140	✓	✓	✓	1.6		✓	TBD	TBD	✓	✓	✓		✓	TBD	TBD	16	††
MAX795R/ST/UT	2.63/2.93/3.08	140	✓	✓	✓	1.6/adj.	✓	✓	TBD	TBD	✓	✓	✓		✓	TBD	TBD	8	††
MAX800L/M	4.60/4.40	140	✓	✓	✓	1.6/adj.	✓	✓	1.2	25	✓	✓	✓		✓	0.1(0.035)	5(0.04)	16	3.88
MAX801L/M	4.68/4.58/4.43	140	✓	✓	✓	1.6		✓	TBD	TBD	✓	✓	✓		✓	TBD	TBD	8	††
MAX802L/M/R/ST	4.60/4.40/	140	✓	✓	✓	1.6		✓	10	400	✓	✓	✓		✓	0.35(0.2)	5(0.05)	8	3.59
MAX804R/ST	2.63/2.93/3.08	140	✓	✓	✓	1.6		✓	6	400	✓	✓	✓		✓	0.5(0.4)	1(0.4)	8	3.66
MAX805L/M/R/ST	4.65/4.40/	140	✓	✓	✓	1.6		✓	10	400	✓	✓	✓		✓	0.35(0.2)	5(0.05)	8	3.26
MAX806R/ST	2.63/2.93/3.08	140	✓	✓	✓	1.6		✓	6	400	✓	✓	✓		✓	0.5(0.4)	1(0.4)	8	3.90
MAX807L/M	4.68/4.58/4.43	140	✓	✓	✓	1.6		✓	TBD	TBD	✓	✓	✓		✓	TBD	TBD	8	††
MAX808L/M	4.68/4.58/4.43	140	✓	✓	✓	1.6		✓	TBD	TBD	✓	✓	✓		✓	TBD	TBD	16	††
MAX809L/M/R/ST	4.65/4.40/	140	✓	✓	✓	1.6		✓	TBD	TBD	✓	✓	✓		✓	0.06(0.024)		3	††
MAX810L/M/R/ST	4.65/4.40/	140	✓	✓	✓	1.6		✓			✓	✓	✓		✓	0.06(0.024)		3	††
MAX813L	4.65	140	✓	✓	✓	1.6		✓			✓	✓	✓		✓	0.35(0.2)		8	1.02*
MAX814K/L/J/T	4.80/4.70/4.55/3.03	140	✓	✓	✓	1.6		✓			✓	✓	✓		✓	TBD	TBD	8	††
MAX815K/L/J/T	4.80/4.70/4.55/3.03	140	✓	✓	✓	1.6		✓			✓	✓	✓		✓	TBD	TBD	8	††
MAX816	Adj./±1%	140	✓	✓	✓	1.6		✓			✓	✓	✓		✓	TBD	TBD	8	††
MAX820L/M/R/ST	4.65/4.40/	140	✓	✓	✓	1		✓	2.5	667	✓	✓	✓		✓	0.15(0.07)	0.1(0.002)	16	3.82
MAX820L/M/R/ST	2.63/2.93/3.08	140	✓	✓	✓	1		✓			✓	✓	✓		✓	0.5(0.23)		8	2.44
MXD1210	4.37/4.62							✓			✓								

† Prices provided are for design guidance and are FOB USA (unless otherwise noted). International prices will differ due to local duties, taxes, and exchange rates.
 †† Future product—contact factory for pricing and availability. Specifications are preliminary.
 * 25,000 pc. price, factory direct

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