带看门狗和手动复位输入电路的电源电压监控器

UM706xS *SOP8*
UM706xM8 *MSOP8*
UM708xS *SOP8*
UM813xS *SOP8*

描述

UM706xS/UM706xM8/UM708xS/UM813xS系列是专为数字系统电源监控设计的成本效益型电源监控电路。

UM706xS/UM706xM8提供电源监控电路，该电路可在上电、关断和掉电情况下产生复位输出。即使V_{CC}低至1V，复位输出仍然可以工作。该器件可提供独立的看门狗监控电路。如果看门狗输入在1.60秒内未触发，该电路会被激活。此外还集成一个1.25V阈值检测器，用于发出电源故障警告、检测低电池电量或监控附加电源。还包括一个带防抖功能的低电平有效手动重置输入。

UM708xS用高电平有效复位取代了看门狗定时器，除此之外与UM706xS相同。UM813xS的RESET是高电平有效而不是低电平有效，除此之外与UM706xS相同。

UM706xS、UM708xS、UM813xS均采用小型SOP8封装。UM706xM8采用MSOP8封装。

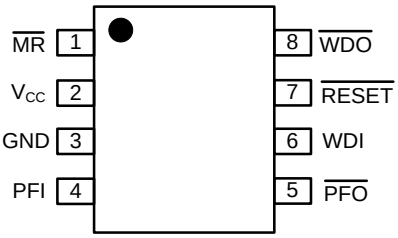
应用

- 使用 DSP、微控制器或微处理器的应用
- 可编程控制器
- 计算机
- 嵌入式系统
- 工业设备
- 智能仪表
- 无线通信系统

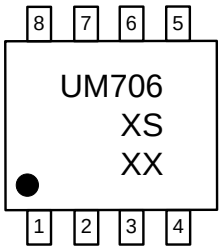
特性

- 电源电压范围：1V 至 5.5V
- V_{CC}=1.0V 时可确保正确逻辑输出
- 精密电压监控：2.32V、2.63V、2.93V、3.08V、4.38V、4.63V
- 复位脉冲宽度：200ms
- 1.6 秒超时的独立看门狗定时器 (UM706xS、UM706xM8、UM813xS)
- 高电平有效复位输出(UM708xS、UM813xS)
- 电压监控器，监控有无电源故障或低电池电量报警
- 工作温度范围：-40℃ 至+85℃
- 供电电流：80μA(典型值)

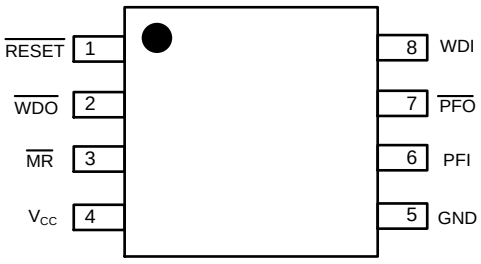
Pin Configurations **Top View**



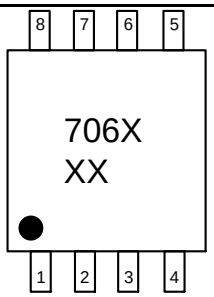
UM706xS



XX: Week Code
UM706xS
SOP8



UM706xM8



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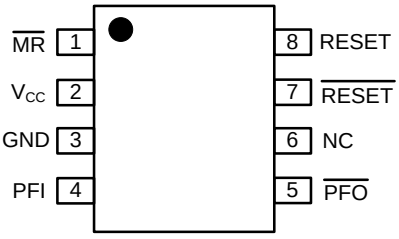
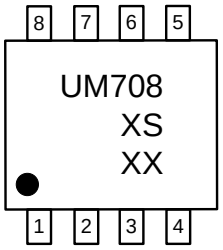


UM708xS



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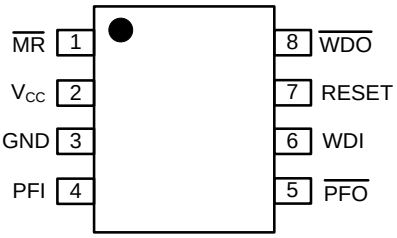
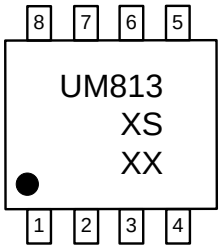


UM813xS



XX: Week Code
UM813xS
SOP8

Ordering Information

Part Number	Top Marking	RESET Threshold (V)	Timeout Period (ms)	Package Type	Shipping Qty
UM706LS	UM706LS	4.63	240	SOP8	3000pcs/13 Inch Tape and Reel
UM706MS	UM706MS	4.38	240		
UM706TS	UM706TS	3.08	240		
UM706SS	UM706SS	2.93	240		
UM706RS	UM706RS	2.63	240		
UM706ZS	UM706ZS	2.32	240		
UM708LS	UM708LS	4.63	240		
UM708MS	UM708MS	4.38	240		
UM708TS	UM708TS	3.08	240		
UM708SS	UM708SS	2.93	240		
UM708RS	UM708RS	2.63	240		
UM813LS	UM813LS	4.63	240		
UM813MS	UM813MS	4.38	240		
UM813TS	UM813TS	3.08	240		
UM813SS	UM813SS	2.93	240		
UM813RS	UM813RS	2.63	240		
UM706LM8	706L	4.63	240	MSOP8	4000pcs/13Inch Tape & Reel
UM706MM8	706M	4.38	240		
UM706TM8	706T	3.08	240		
UM706SM8	706S	2.93	240		
UM706RM8	706R	2.63	240		
UM706ZM8	706Z	2.32	240		

Typical Application Circuits

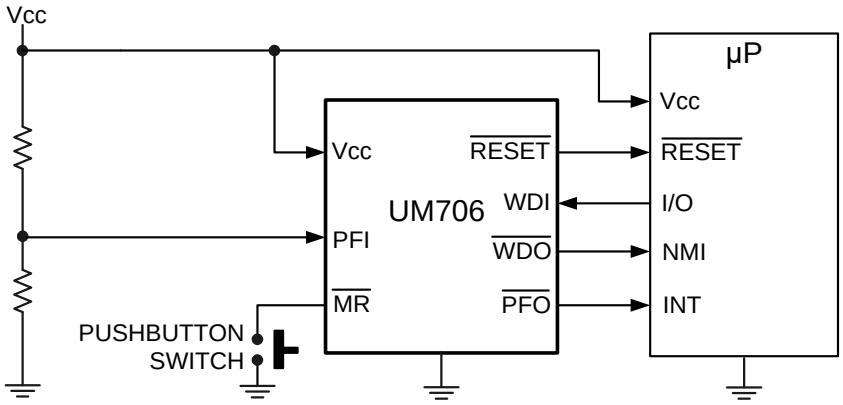


Figure 1. UM706xS/UM706xM8 Application Circuit

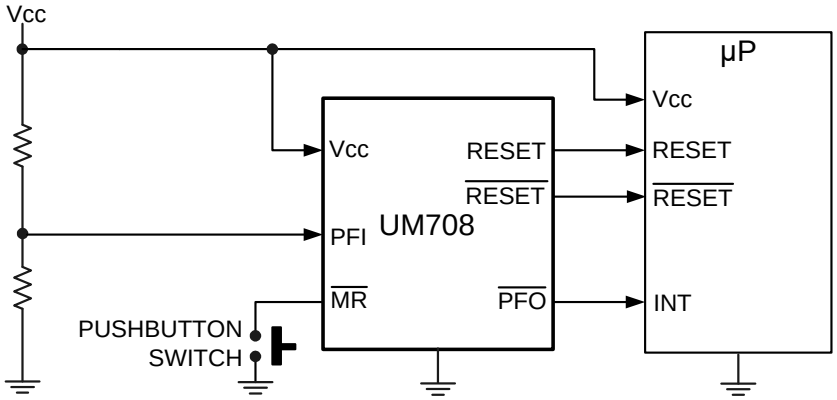


Figure 2. UM708xS Application Circuit

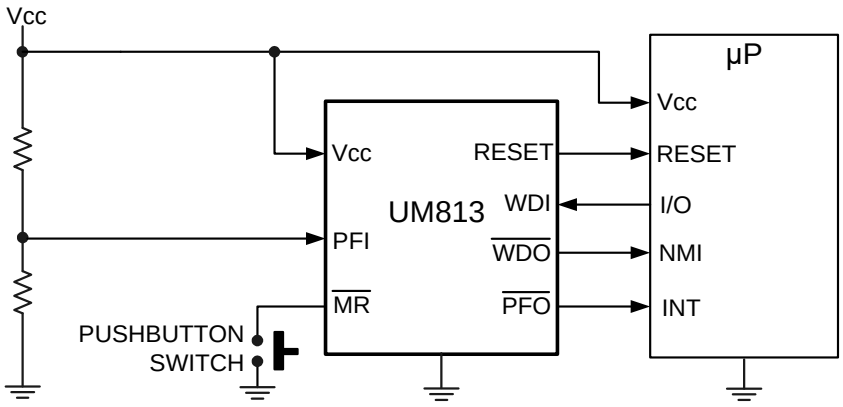


Figure 3. UM813xS Application Circuit

Pin Description

Pin Name	Function
$\overline{MR}$	Manual-Reset Input triggers a reset pulse when pulled below 0.8V. This active-low input has an internal 250μA pull-up current. It can be driven from a TTL or CMOS logic line as well as shorted to ground with a switch.
V_{CC}	Supply Input.
GND	Ground Reference for all signals.
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.
$\overline{PFO}$	Power-Fail Output goes low and sinks current when PFI is less than 1.25V; otherwise $\overline{PFO}$ stays high.
WDI	Watchdog Input. If WDI remains either high or low for 1.6sec, the internal watchdog timer runs out and the $\overline{WDO}$ goes low. 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.
NC	Not Connected.
$\overline{RESET}$	Active-Low Reset Output pulses low for 200ms when trigged, and stays low whenever V_{CC} is below the reset threshold. It remains low for 200ms after V_{CC} rises above the reset threshold or $\overline{MR}$ goes from Low to High.
RESET	Active-High Reset Output is the inverse of $\overline{RESET}$. Whenever RESET is high, $\overline{RESET}$ is low, and vice versa.
$\overline{WDO}$	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.
RESET	Active-High Reset Output is the inverse of $\overline{RESET}$. Whenever RESET is high, $\overline{RESET}$ is low, and vice versa.

Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	-0.3 to +6.0	V
	RESET, $\overline{\text{RESET}}$ (Push-Pull)	-0.3 to V_{CC}+0.3	V
I_{CC}	Input Current, V_{CC}	20	mA
I_O	Output Current, RESET, $\overline{\text{RESET}}$	20	mA
	Rate of Rise, V_{CC}	100	V/μs
P_D	Continuous Power Dissipation	471	mW
T_J	Operating Junction Temperature	-40 to +105	℃
T_{STG}	Storage Temperature Range	-65 to +150	℃
	Lead Temperature (Soldering, 10s)	300	℃

Note 1: Stresses beyond those listed under "Absolute maximum Ratings" may cause permanent damage to the device.

Electrical Characteristics

V_{CC}=full range, T_A=-40℃ to +85℃, unless otherwise noted. Typical values are at T_A=+25℃, V_{CC}=5V for L/M versions, V_{CC}=3.3V for T/S versions and V_{CC}=3V for R version, and V_{CC}=2.5V for Z version. (Note 2)

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CC}	V_{CC} Range	T_A=0℃ to +70℃		1.0		5.5	V
		T_A=-40℃ to +85℃		1.2		5.5	
I_{CC}	Supply Current	T_A=-40℃ to +85℃			80	150	μA
V_{TH}	Reset Threshold	UM706LS/UM706LM8 UM708LS/UM813LS	T_A=+25℃	4.53	4.63	4.73	V
			T_A=-40℃ to +85℃	4.50		4.75	
		UM706MS/UM706MM8 UM708MS/UM813MS	T_A=+25℃	4.29	4.38	4.47	
			T_A=-40℃ to +85℃	4.25		4.50	
		UM706TS/UM706TM8 UM708TS/UM813TS	T_A=+25℃	3.01	3.08	3.15	
			T_A=-40℃ to +85℃	3.00		3.16	
		UM706SS/UM706SM8 UM708SS/UM813SS	T_A=+25℃	2.87	2.93	2.99	
			T_A=-40℃ to +85℃	2.85		3.00	
		UM706RS/UM706RM8 UM708RS/UM813RS	T_A=+25℃	2.57	2.63	2.69	
			T_A=-40℃ to +85℃	2.55		2.70	
		UM706ZS/UM706ZM8	T_A=+25℃	2.27	2.32	2.37	
			T_A=-40℃ to +85℃	2.24		2.39	
	Reset Threshold Hysteresis				40		mV
t_{RS}	Reset Pulse Width			140	200	280	ms

Note 2: Production testing done at T_A=+25℃; limits over temperature guaranteed by design only.

Electrical Characteristics (Continued)

V_{CC}=full range, T_A=-40℃ to +85℃, unless otherwise noted. Typical values are at T_A=+25℃, V_{CC}=5V for L/M versions, V_{CC}=3.3V for T/S versions and V_{CC}=3V for R version, and V_{CC}=2.5V for Z version. (Note 2)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OL}	RESET/$\overline{\text{RESET}}$ Output Voltage Low	I_{SINK}=1.2mA (for R/S/T/Z versions)			0.3	V
		I_{SINK}=3.2mA (for L/M versions)			0.4	
		V_{CC}=1.2V, I_{SINK}=100μA			0.3	
V_{OH}	RESET/$\overline{\text{RESET}}$ Output Voltage High	I_{SOURCE}=800μA	0.7V_{CC}			V
	$\overline{\text{MR}}$ Pull-Up Current	$\overline{\text{MR}}$=0V			600	μA
t_{MR}	$\overline{\text{MR}}$ Pulse Width		150			ns
	$\overline{\text{MR}}$ Input Threshold, Low				0.8	V
	$\overline{\text{MR}}$ Input Threshold, High		2.0			V
t_{MD}	$\overline{\text{MR}}$ to Reset Out Delay				250	ns
	PFI Input Threshold	V_{CC}=5V	1.20	1.25	1.30	V
	PFI Input Current		-25	0.01	+25	nA
	$\overline{\text{PFO}}$ Output Voltage	I_{SOURCE}=800μA	0.7V_{CC}			V
		I_{SINK}=3.2mA			0.4	
Watchdog Function for UM706/UM813						
t_{WD}	Watchdog Timeout Period		1.0	1.6	2.25	s
t_{WP}	WDI Pulse Width	V_{IL}=0.4V, V_{IH}=0.8V_{CC}	50			ns
	WDI Input Threshold Low	V_{CC}=5V			0.8	V
	WDI Input Threshold High	V_{CC}=5V	3.5			V
	WDI Input Current	WDI=V_{CC}			10	μA
		WDI=0V	-10			
	WDO Output Voltage High	I_{SOURCE}=800μA	0.7V_{CC}			V
	WDO Output Voltage Low	I_{SINK}=1.2mA			0.4	V

Note 2: Production testing done at T_A=+25℃; limits over temperature guaranteed by design only.

Block Diagram

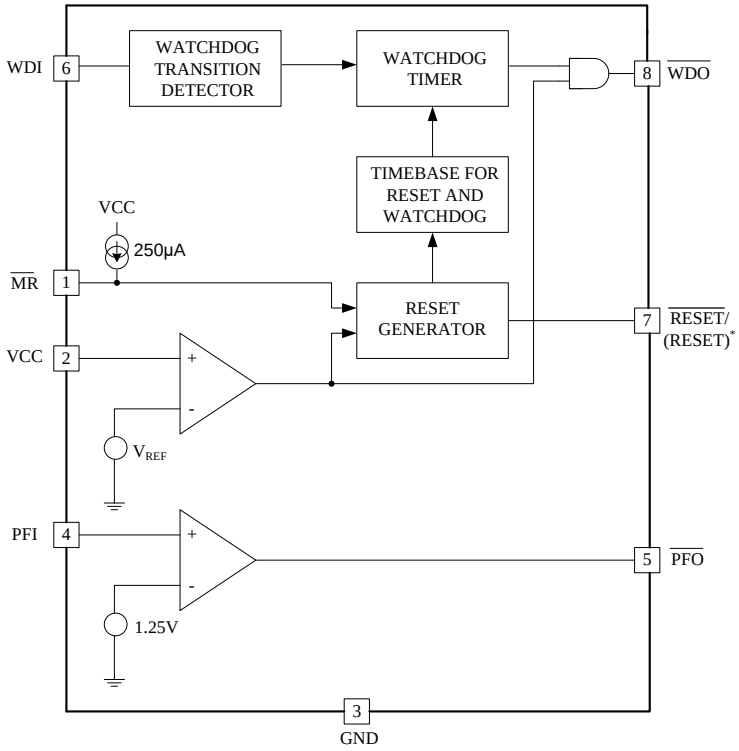


Figure 4. UM706xS/UM813xS Block Diagram
(RESET)* for UM813xS

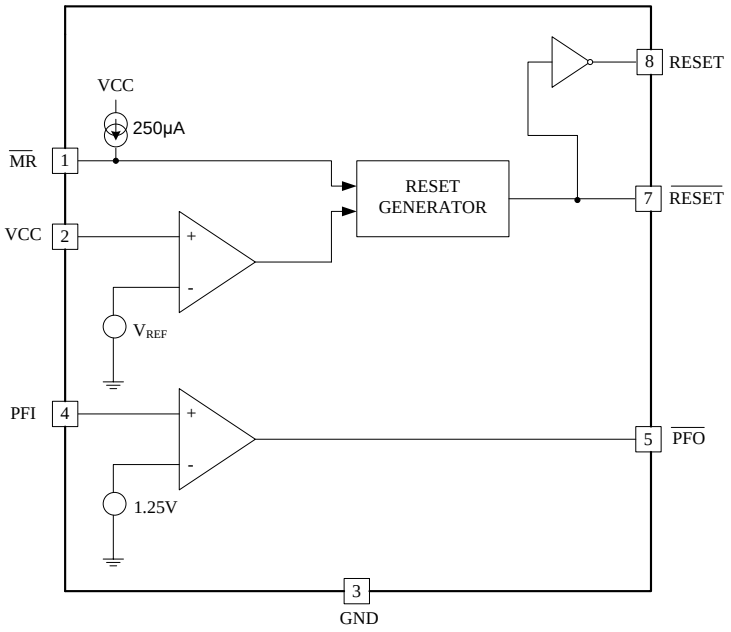


Figure 5. UM708xS Block Diagram

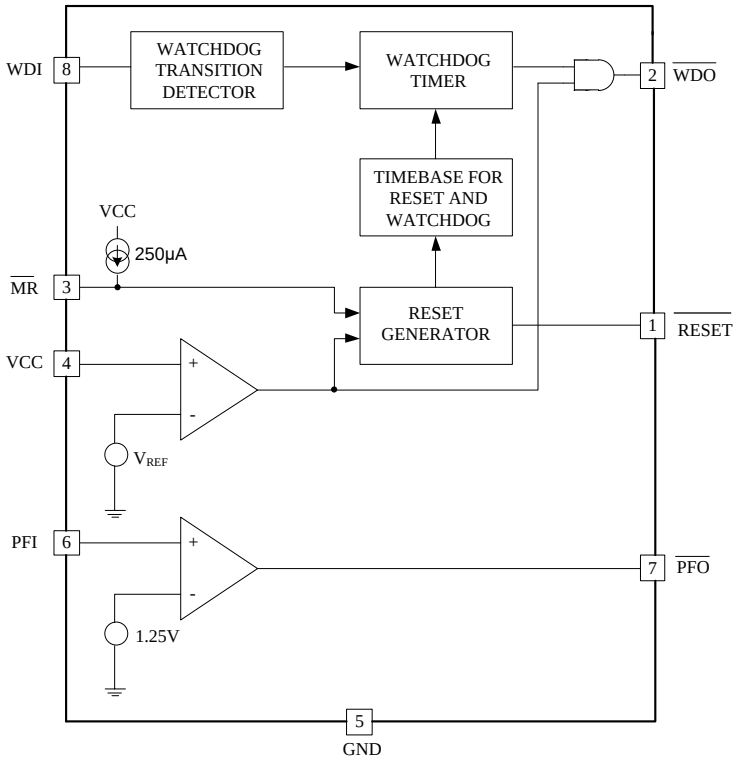
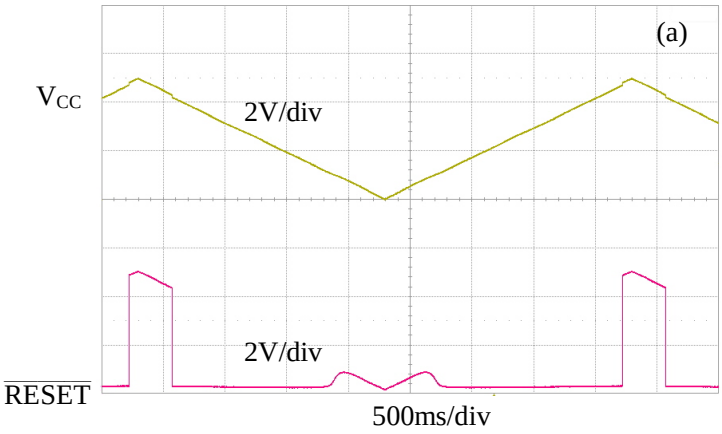


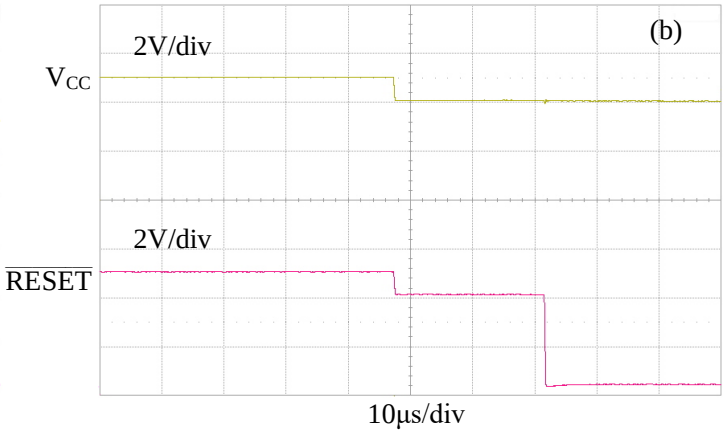
Figure 6. UM706xM8 Block Diagram

Typical Operating Characteristics

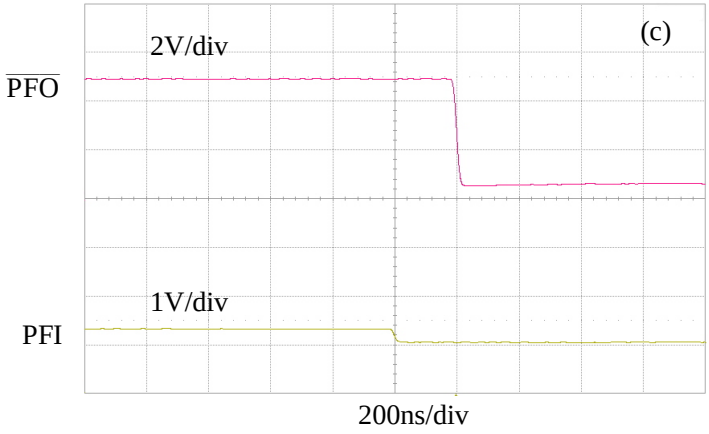
$\overline{\text{RESET}}$ Output Voltage vs. Supply Voltage



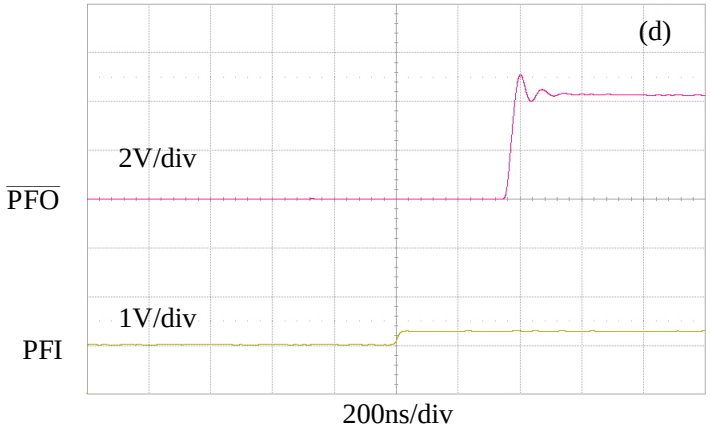
$\overline{\text{RESET}}$ Response Time

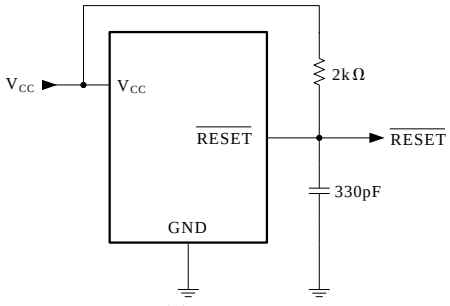


Power-Fail Comparator Assertion Response Time

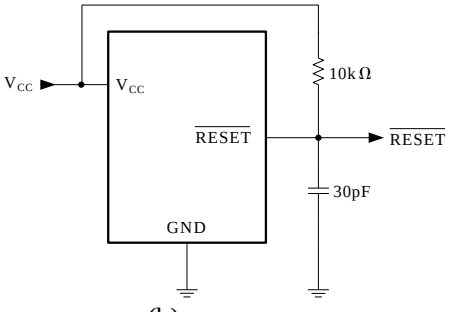


Power-Fail Comparator De-assertion Response Time





(a)



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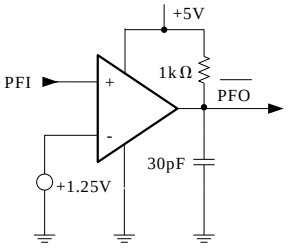

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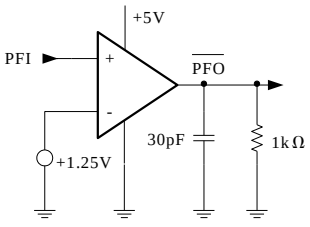
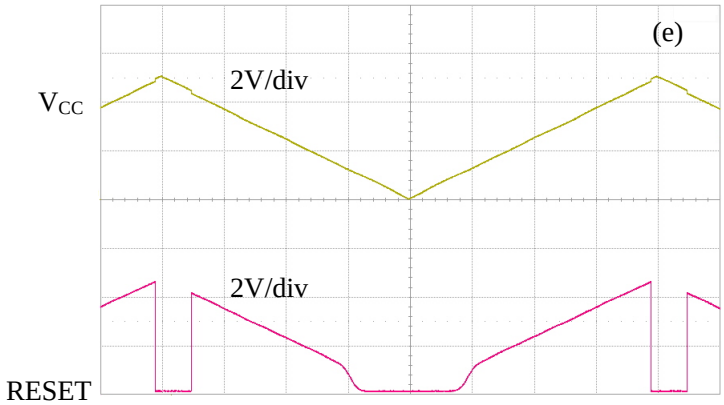


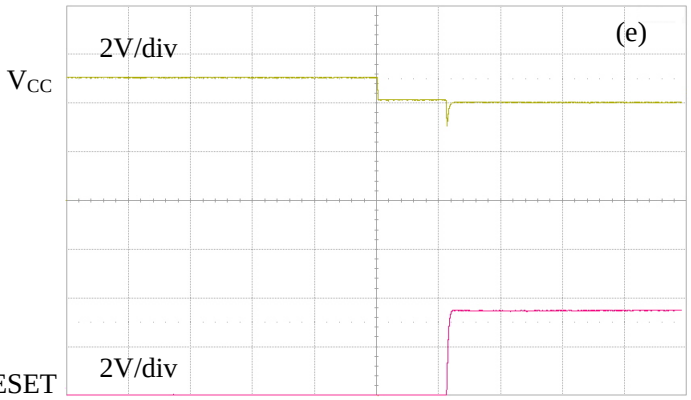
(d)

Typical Operating Characteristics (Continued)

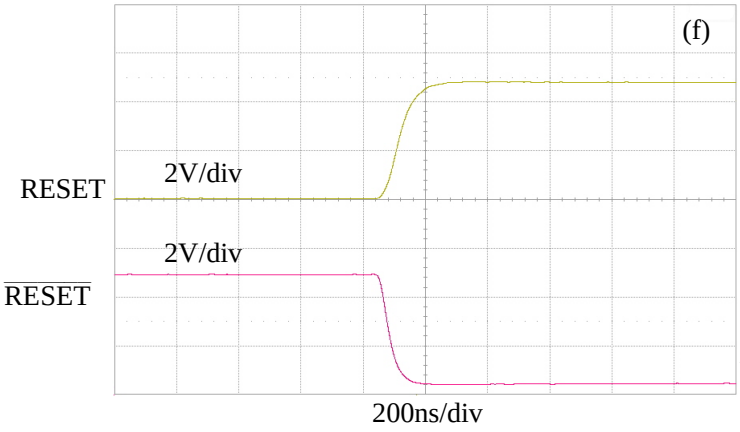
RESET Output Voltage vs. Supply Voltage



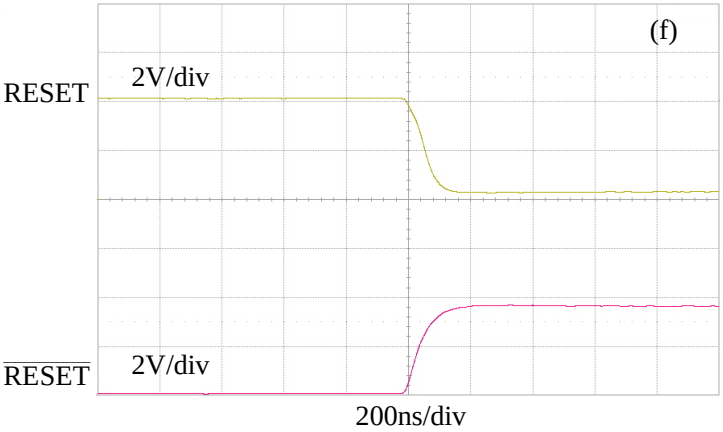
RESET Response Time

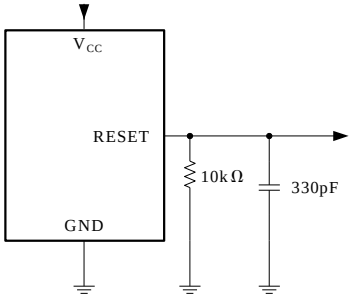


RESET, $\overline{\text{RESET}}$ Assertion



RESET, $\overline{\text{RESET}}$ De-assertion





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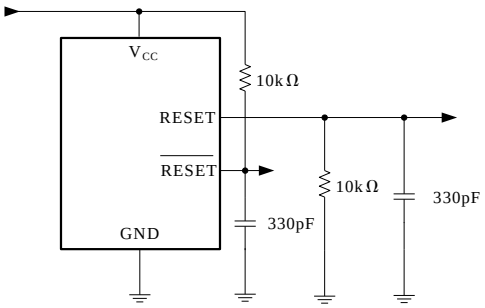


(f)

Detailed Description

Power-Fail Reset

The reset output provides a reset signal to the microprocessor whenever the V_{CC} input is below the threshold. An internal timer holds the reset output active for 200ms after the voltage on V_{CC} rises above the threshold. This is intended as a power-on reset signal for the microprocessor. It allows time for both the power supply and the microprocessor to stabilize after power-up. If a power supply brownout or interruption occurs, the reset line is similarly activated and remains active for 200ms after the supply recovers. If another interruption occurs during an active reset period, the reset timeout period continues for an additional 200ms.
The reset output is guaranteed to remain valid with V_{CC} as low as 1V. This ensures that the microprocessor is held in a stable shutdown condition as the power supply starts up.
The UM706xS/UM706xM8 provides an active low $\overline{RESET}$ signal while the UM813xS provides an active high RESET signal. The UM708xS has both an active high RESET output and an active low $\overline{RESET}$ output.

Power-Fail Comparator

The power-fail comparator can be used for various purposes because its output and non-inverting input are not internally connected. The inverting input is internally connected to a 1.25V reference.
To build an early-warning circuit for power failure, connect the PFI pin to a voltage driver, choose the voltage divider ratio so that the voltage at PFI falls below 1.25V just before the regulator drops out. Use $\overline{PFO}$ to interrupt the μP so it can prepare for an orderly power-down.

Manual Reset

The Manual-Reset input ($\overline{MR}$) allows reset to be trigged by a pushbutton switch. The switch is effectively debounced by the 140ms minimum reset pulse width. $\overline{MR}$ is TTL/CMOS logic compatible, so it can be driven by an external logic line. If unused, $\overline{MR}$ input can be tied high or left floating.

Watchdog Timer

The UM706xS/UM706xM8/UM813xS watchdog circuit monitors the μP's activity. If the μP does not toggle the watchdog input (WDI) within 1.6sec and WDI is not three-stated, $\overline{WDO}$ goes low. As long as $\overline{RESET}$ 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, $\overline{WDO}$ will be connected to the non-maskable interrupt input (NMI) of a μP. When V_{CC} drops below the reset threshold, $\overline{WDO}$ will go low whether or not the watchdog timer has timed out yet. Normally this would trigger an NMI interrupt, but $\overline{RESET}$ goes low simultaneously, and thus overrides the NMI interrupt.
If WDI is left unconnected, $\overline{WDO}$ can be used as a low-line output. Since floating WDI disables the internal timer, $\overline{WDO}$ goes low only when V_{CC} falls below the reset threshold, thus functioning as a low-line output.
The UM706xS/UM706xM8 has a watchdog timer and a $\overline{RESET}$ output. The UM708xS has both active-high and active-low reset outputs. The UM813xS has both an active-high reset output and a watchdog timer.

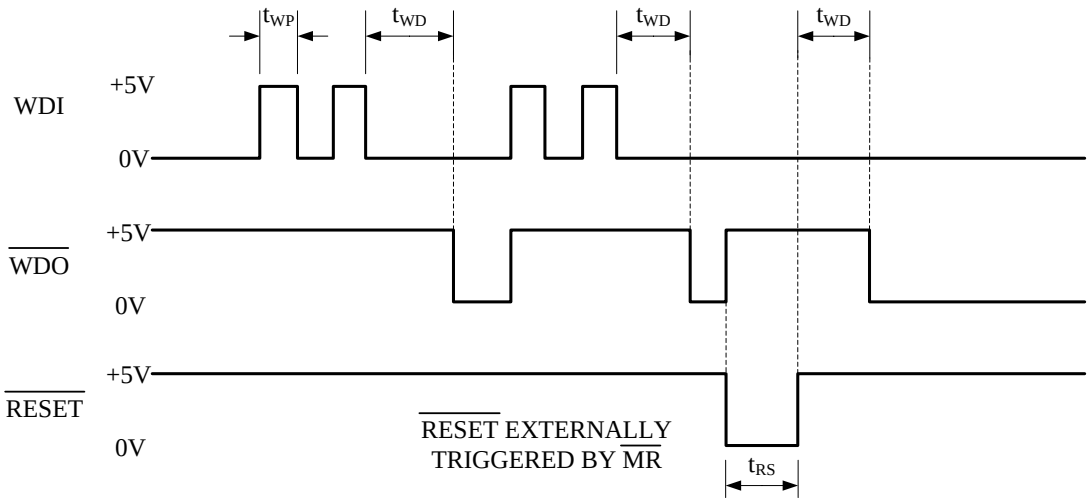


Figure 7. Watchdog and Reset Timing

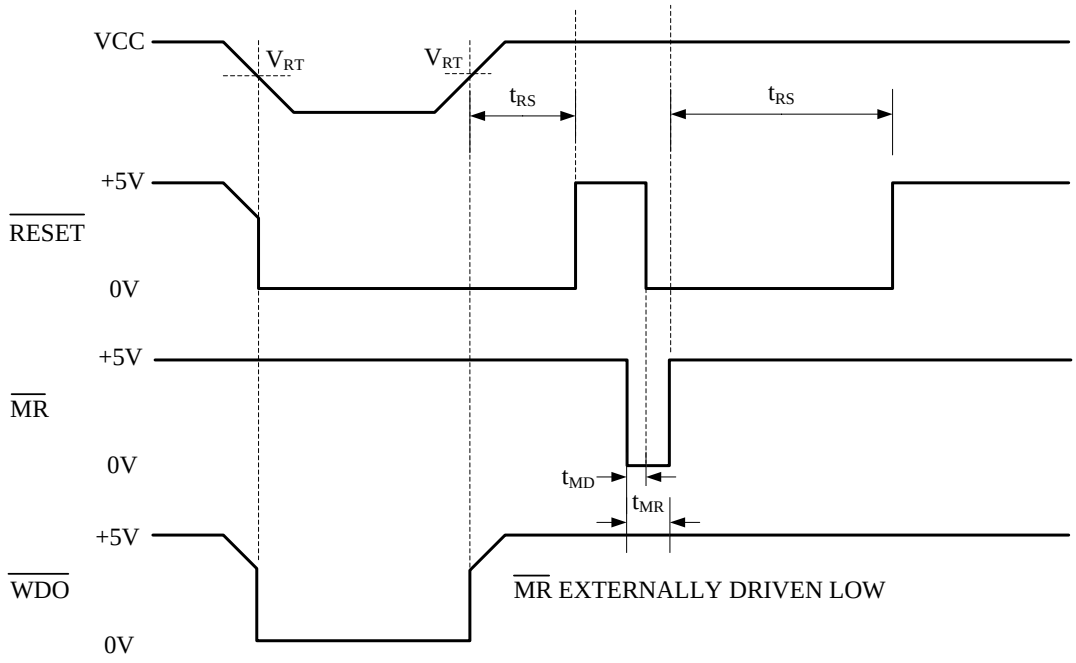


Figure 8. Reset, Manual Reset and Watchdog Timing

Applications Information

Valid $\overline{\text{RESET}}$ below 1V V_{CC}

The UM706xS/UM706xM8/UM708xS/UM813xS are guaranteed to provide a valid reset level with V_{CC} as low as 1V. When V_{CC} falls below 1V, the internal transistor does not have sufficient drive to hold it on so the voltage on $\overline{\text{RESET}}$ is no longer held at 0V. If a pull-down resistor is added to the $\overline{\text{RESET}}$ pin as shown in Figure 9, any stray charge or leakage current will be drained to ground, holding $\overline{\text{RESET}}$ low. Resistor value (R1) is not critical. It should be about 100kΩ, large enough not to load $\overline{\text{RESET}}$ and small enough to pull $\overline{\text{RESET}}$ to ground.

Monitoring Additional Supply Levels

It is possible to use the power-fail comparator to monitor a second supply as shown in Figure 10. The two sensing resistors, R1 and R2, are selected such that the voltage on PFI drops below 1.25V at the minimum acceptable input supply. The $\overline{\text{PFO}}$ output can be connected to the $\overline{\text{MR}}$ input so that a reset is generated when the supply drops out of tolerance. In this case, if either supply drops out of tolerance, a reset is generated.

Monitoring a Negative Voltage

The power-fail comparator can also monitor a negative supply rail (Figure 11). 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 UM706xS/UM706xM8/UM708xS/UM813xS will keep reset asserted ($\overline{\text{RESET}}$ =low, RESET=high). Note that this circuit's accuracy depends on the PFI threshold tolerance, the V_{CC} line, and the resistors.

Microprocessor with Bidirectional Reset

To prevent contention for microprocessors with a bidirectional reset line, a current limiting resistor is to be inserted between the $\overline{\text{RESET}}$ output pin and the microprocessor reset pin. This limits the current to a safe level if there are conflicting output reset levels. A suitable resistor value is 4.7kΩ. If the reset output is required for other uses, it should be buffered as shown in Figure 12.

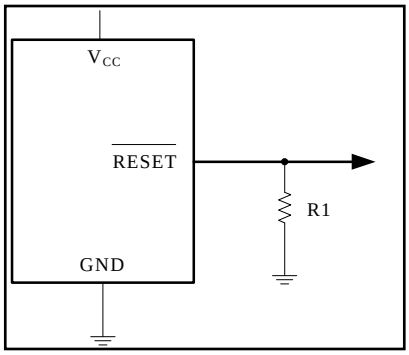


Figure 9. Reset Valid to Ground Circuit

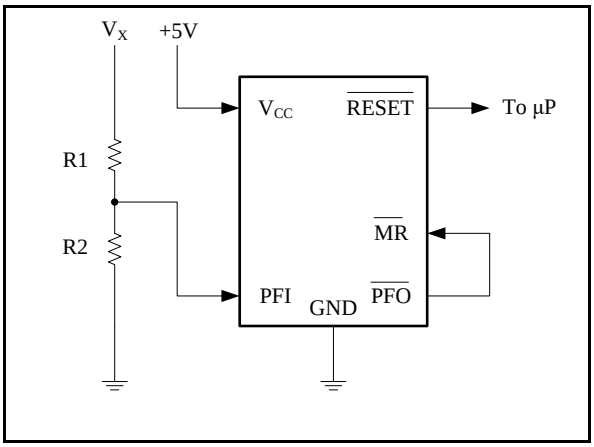


Figure 10. Monitoring an Additional Supply V_X

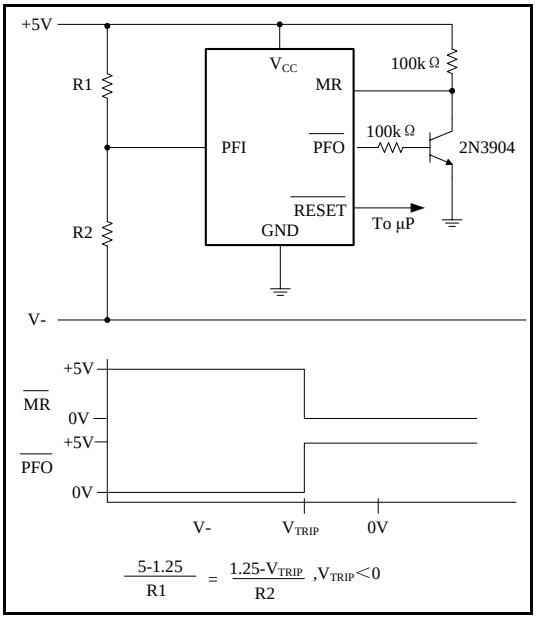


Figure 11. Monitoring a Negative Voltage

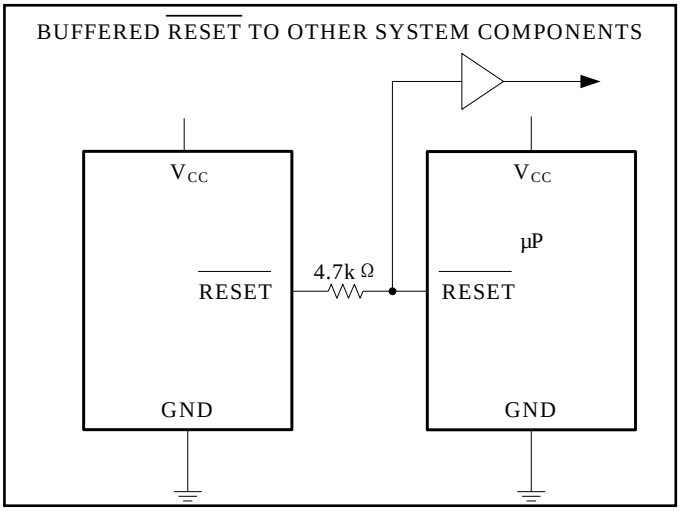
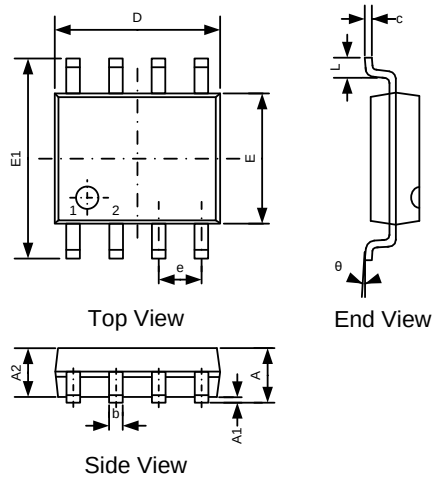


Figure 12. Bidirectional Reset I/O

Package Information

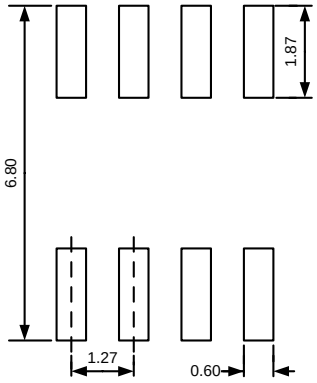
SOP8

Outline Drawing



Symbol	DIMENSIONS					
	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	1.35	1.55	1.75	0.053	0.061	0.069
A1	0.10	-	0.25	0.004	-	0.010
A2	1.25	-	1.65	0.049	-	0.065
b	0.30	-	0.51	0.012	-	0.020
c	0.15	-	0.25	0.006	-	0.010
D	4.70	4.90	5.10	0.185	0.193	0.200
E	3.80	3.90	4.00	0.150	0.154	0.157
E1	5.80	6.00	6.20	0.228	0.236	0.244
e	1.27BSC			0.050 BSC		
L	0.40	-	1.27	0.016	-	0.050
θ	0 °	-	8 °	0 °	-	8 °

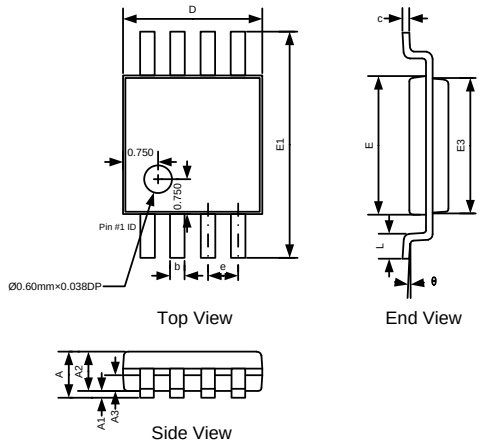
Land Pattern



NOTES:
1. Compound dimension: 4.90×3.90;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

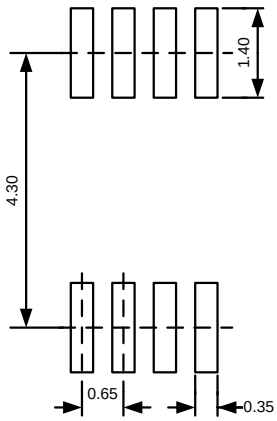
MSOP8

Outline Drawing



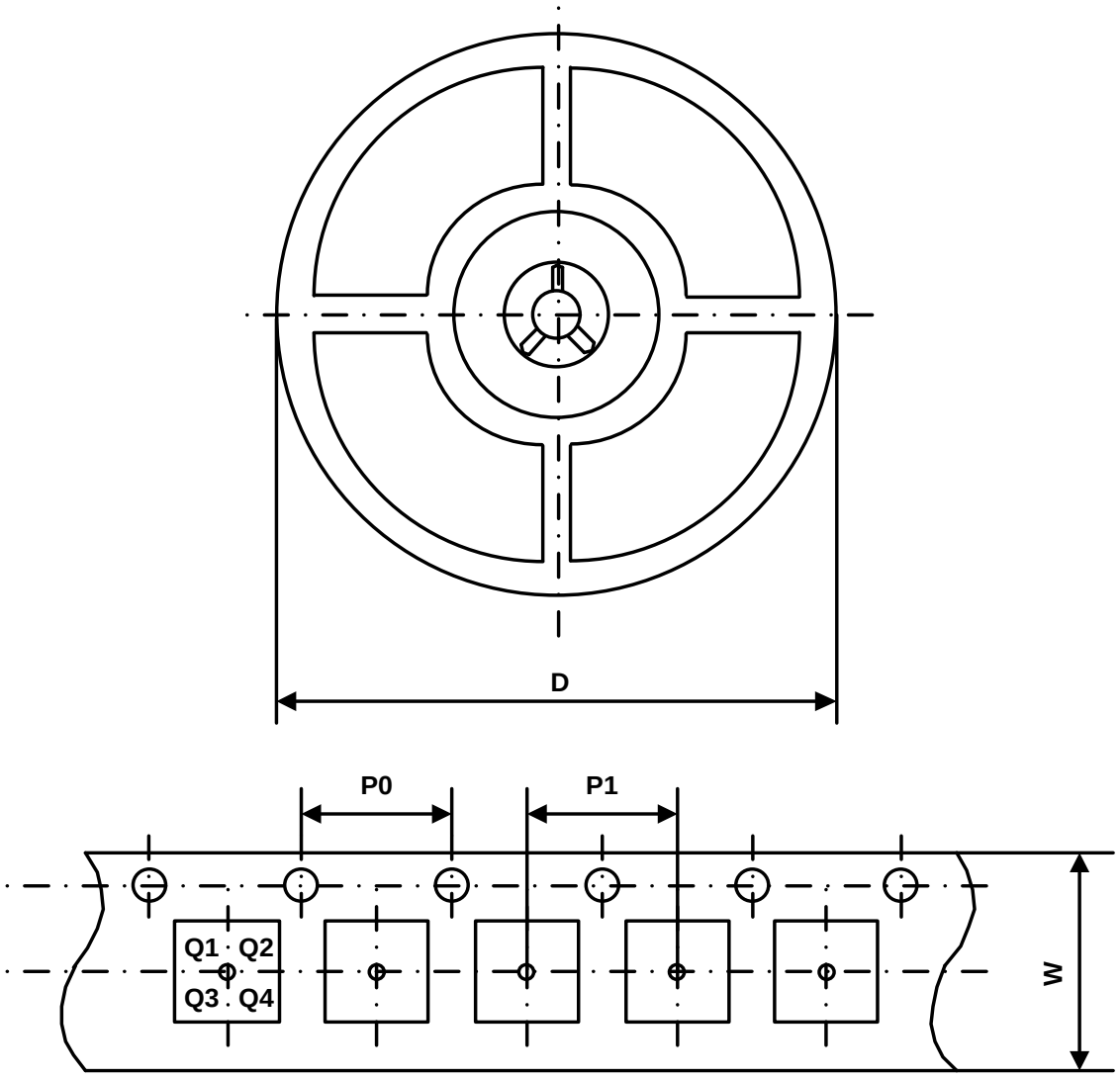
DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	-	-	1.10	-	-	0.043
A1	0.02	-	0.15	0.0008	-	0.006
A2	0.75	0.86	0.95	0.030	0.034	0.037
A3	0.29	0.39	0.49	0.011	0.015	0.019
b	0.22	-	0.38	0.009	-	0.015
c	0.08	0.15	0.23	0.003	0.006	0.009
D	2.90	3.00	3.10	0.114	0.118	0.122
E	2.90	3.00	3.10	0.114	0.118	0.122
E1	4.70	4.90	5.10	0.185	0.193	0.201
E3	2.85	2.95	3.05	0.112	0.116	0.120
e	0.65BSC			0.026BSC		
L	0.40	0.60	0.80	0.016	0.024	0.031
θ	0°	-	8°	0°	-	8°

Land Pattern



NOTES:
1. Compound dimension: 3.00×3.00;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Packing Information



Part Number	Package Type	Carrier Width (W)	Pitch (P0)	Pitch (P1)	Reel Size (D)	PIN 1 Quadrant
UM706xS	SOP8	12 mm	4 mm	8 mm	330 mm	Q1
UM706xM8	MSOP8	12 mm	4 mm	8 mm	330 mm	Q1
UM708xS	SOP8	12 mm	4 mm	8 mm	330 mm	Q1
UM813xS	SOP8	12 mm	4 mm	8 mm	330 mm	Q1

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http://www.union-ic.com/index.aspx?cat_code=RoHSDeclaration

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