3引脚微处理器复位电路

UM803 *SOT323/SOT23-3*

描述

UM803是一款用于监控微处理器（μP）和数字系统电源的监控电路。当该器件与 +5V、+3.3V、+3.0V 或 +2.5V 供电电路配合使用时，无需外部元件，也不用进行调整，可实现非常可靠的低成本电路。

UM803仅执行单一功能。每当V_{CC}电源电压下降至预设阈值以下时，该器件将会输出复位信号，并在V_{CC}上升到复位阈值以上后，将该信号保持输出状态至少140ms。适用于多种电源电压的重置阈值可供选择。

UM803有一个开漏输出。UM803的开漏低电平有效复位输出$\overline{RESET}$需要一个上拉电阻，该电阻可连接到高于 V_{CC} 的电压。UM803有一个低电平有效复位输出，复位比较器旨在忽略V_{CC}的快速瞬变，并确保在V_{CC}低至1V时，输出能够处于正确逻辑状态。

低供电电流使UM803非常适合用于便携式设备。UM803采用3引脚SOT323和SOT23封装。

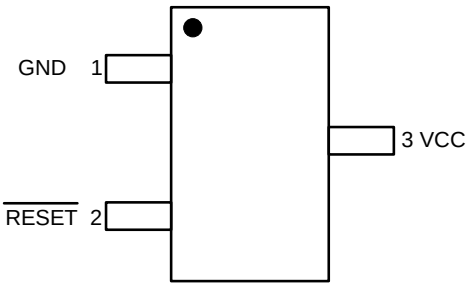
应用

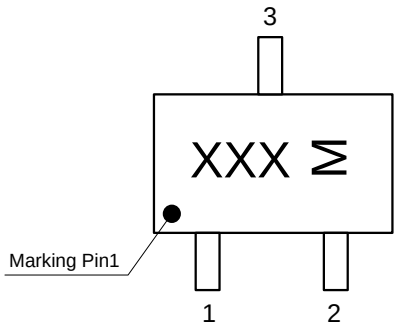
- 计算机
- 控制器
- 便携式电池电源供电设备
- 智能仪表
- 精确的 μP 和 μC 电源监控
- 汽车

特性

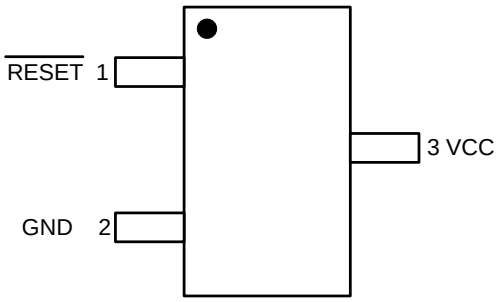
- 无需外部元件
- 电源瞬变抗扰度
- 确保 V_{CC}=1V 时的正确逻辑输出
- 可对+2.5V、+3V、+3.3V 和+5V 电源进行精确电压监控
- 工作温度范围内稳定可靠
- 供电电流：2μA
- 最小上电复位脉冲宽度：140ms
- 提供单一输出配置：
  低电平有效的开漏复位输出$\overline{RESET}$
- 3 引脚 SOT323 和 SOT23 封装
- 工作温度范围：-40℃ 至+85℃

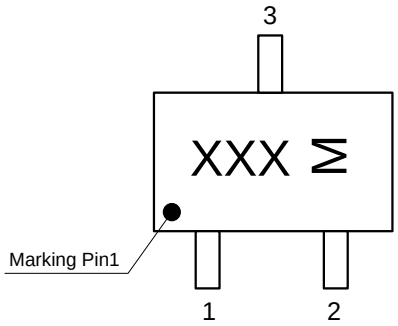
Pin Configurations **Top View**





M: Month Code
UM803
SOT323/SOT23-3



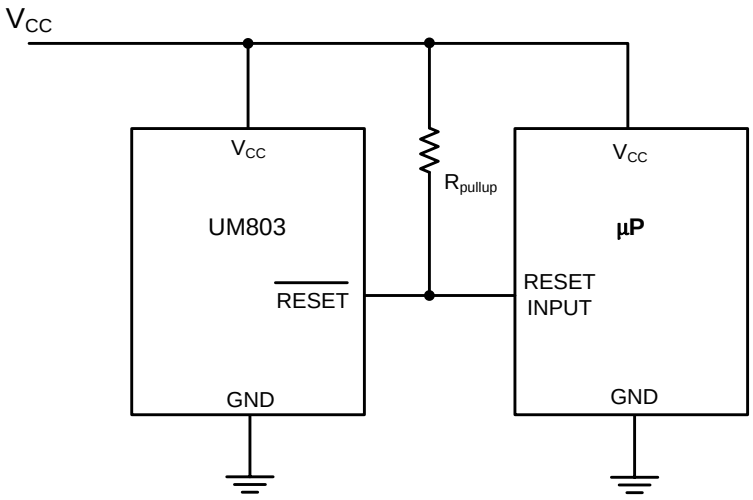


M: Month Code
UM803xSR
SOT23-3

Ordering Information

UM8 XX Z P
XX: Output Type
=03 Open-Drain Active Low
Z: Reset Threshold (V)
=L 4.63
=M 4.38
=J 4.00
=T 3.08
=S 2.93
=R 2.63
=Z 2.32
P: Package Type
=S SOT23-3
=P SOT323

Typical Operating Circuit



Pin Description

Pin Name	Function
GND	Ground
$\overline{\text{RESET}}$	$\overline{\text{RESET}}$ Output remains low while V_{CC} is below the reset threshold, and for at least 140ms after V_{CC} rises above the reset threshold.
V_{CC}	+5V, +3.3V, +3V or +2.5V Supply Voltage

Absolute Maximum Ratings (Note 1)

Symbol	Parameter		Value	Unit
V_{CC}	Supply Voltage		-0.3 to +6.0	V
	$\overline{RESET}$		-0.3 to +6.0	
I_{CC}	Input Current, V_{CC}		20	mA
I_O	Output Current, $\overline{RESET}$		20	mA
	Rate of Rise, V_{CC}		100	V/μs
P_D	Continuous Power Dissipation	SOT323 (Derate 2.17mW/℃ above 70℃)	174	mW
		SOT23-3 (Derate 4mW/℃ above 70℃)	320	
T_A	Operating Temperature Range	SOT323	-40 to +125	℃
		SOT23-3	-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. 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 are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Electrical Characteristics

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

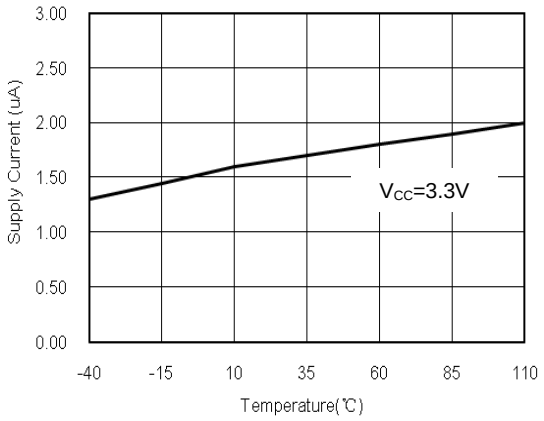
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CC}	Supply Voltage Range	T_A=0℃ to +70℃		1.0		5.5	V
I_{CC}	Supply Current				2.0		μA
V_{TH}	Reset Threshold	L Version	T_A=+25℃	4.56	4.63	4.70	V
			T_A=-40℃ to +85℃	4.50		4.75	
		M Version	T_A=+25℃	4.31	4.38	4.45	
			T_A=-40℃ to +85℃	4.25		4.50	
		J Version	T_A=+25℃	3.93	4.00	4.06	
			T_A=-40℃ to +85℃	3.89		4.10	
		T Version	T_A=+25℃	3.04	3.08	3.11	
			T_A=-40℃ to +85℃	3.00		3.15	
		S Version	T_A=+25℃	2.89	2.93	2.96	
			T_A=-40℃ to +85℃	2.85		3.00	
		R Version	T_A=+25℃	2.59	2.63	2.66	
			T_A=-40℃ to +85℃	2.55		2.70	
		Z Version	T_A=+25℃	2.28	2.32	2.35	
			T_A=-40℃ to +85℃	2.25		2.38	
	Reset Threshold Tempco				150		ppm/℃
	V_{CC} to Reset Delay	V_{CC}=V_{TH} to (V_{TH}–100mV)			10		μs
t_{RP}	Reset Active Timeout Period			140	240	560	ms
V_{OL}	$\overline{RESET}$ Output Voltage Low	V_{CC}=V_{TH} min, I_{SINK}=1.2mA, UM803T_/S_/R_/Z_				0.3	V
		V_{CC}=V_{TH} min, I_{SINK}=3.2mA, UM803L_/M_/J_				0.4	
		V_{CC}>1.0V, I_{SINK}=50μA				0.3	
	RESET Open-Drain Output Leakage Current (Note 3)	V_{CC}>V_{TH}, RESET Deasserted				1	μA

Note 2: Production testing done at T_A=+25℃; limits over temperature guaranteed by design only.
Note 3: Guaranteed by design, not production tested.

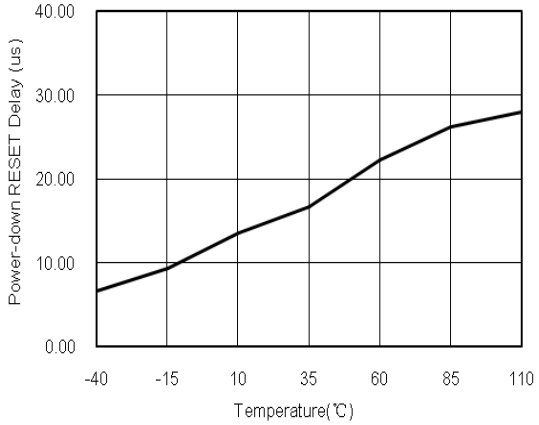
Typical Operating Characteristics

(T_A=+25℃, unless otherwise noted.)

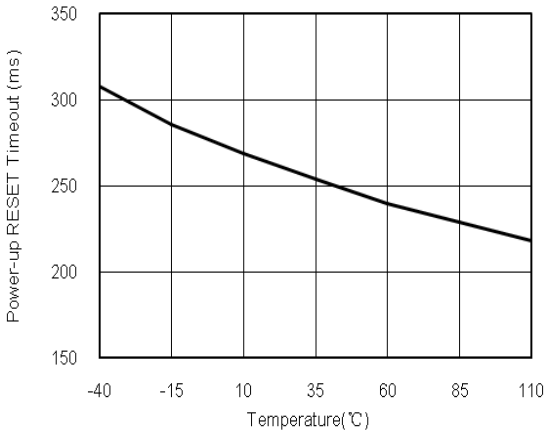
Supply Current vs. Temperature (UM803R_)



Power-Down RESET Delay vs. Temperature (UM803R_)



Power-Up RESET Timeout vs. Temperature



Detailed Description

A microprocessor's (µP's) reset input starts the µP in a known state. The UM803 asserts reset to prevent code-execution errors during power-up, power-down, or brownout conditions. It asserts a reset signal whenever the V_{CC} supply voltage declines below a preset threshold, keeping it asserted for at least 140ms after V_{CC} has risen above the reset threshold. The UM803 uses an open-drain output. Connect a pull-up resistor on the UM803's $\overline{\text{RESET}}$ output to any supply between 0 and 6V.

Applications Information

Negative-Going V_{CC} Transient

In addition to issuing a reset to the µP during power-up, power-down, and brownout conditions, the UM803 is relatively immune to short-duration negative-going V_{CC} transients (glitches).
Figure 1 shows typical transient duration vs. reset comparator overdrive, for which the UM803 does not generate a reset pulse. The graph was generated using a negative-going pulse applied to V_{CC}, starting 0.5V above the actual reset threshold and ending below it by the magnitude indicated (reset comparator overdrive). The graph indicates the maximum pulse width a negative-going V_{CC} transient can have without causing a reset pulse. As the magnitude of the transient increases (goes farther below the reset threshold), the maximum allowable pulse width decreases. Typically, for the UM803L_, UM803M_ and UM803J_, a V_{CC} transient that goes 100mV below the reset threshold and lasts 20µs or less will not cause a reset pulse. A 0.1µF bypass capacitor mounted as close as possible to the V_{CC} pin provides additional transient immunity.

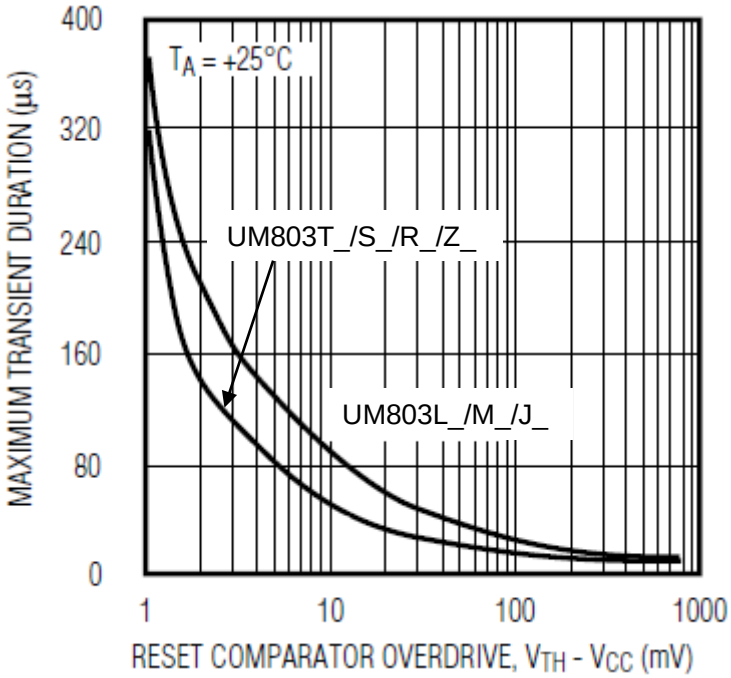


Figure 1. Maximum Transient Duration without Causing a Reset Pulse vs. Reset Comparator Overdrive

Interfacing to µPs with Bidirectional Reset Pins

Since the $\overline{\text{RESET}}$ output on the UM803 is open drain, this device interfaces easily with µPs that have bidirectional reset pins, such as the Motorola 68HC11. Connecting the µP supervisor's $\overline{\text{RESET}}$ output directly to the microcontroller's (µC's) $\overline{\text{RESET}}$ pin with a single pull-up resistor allows either device to assert reset (Figure 2).

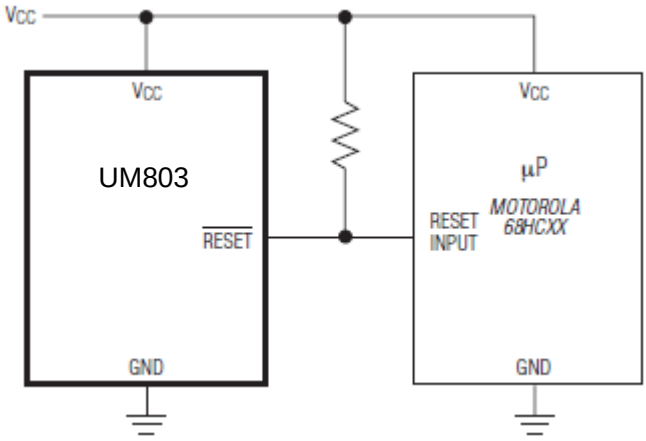


Figure 2. Interfacing to µPs with Bidirectional Reset I/O

UM803 Open-Drain $\overline{\text{RESET}}$ Output Allows Use with Multiple Supplies

Generally, the pull-up connected to the UM803 will connect to the supply voltage that is being monitored at the IC's V_{CC} pin. However, some systems may use the open-drain output to level-shift from the monitored supply to reset circuitry powered by some other supply (Figure 3). Note that as the UM803's V_{CC} decreases below 1V, so does the IC's ability to sink current at $\overline{\text{RESET}}$. Also, with any pull-up, $\overline{\text{RESET}}$ will be pulled high as V_{CC} decays toward 0. The voltage where this occurs depends on the pull-up resistor value and the voltage to which it is connected.

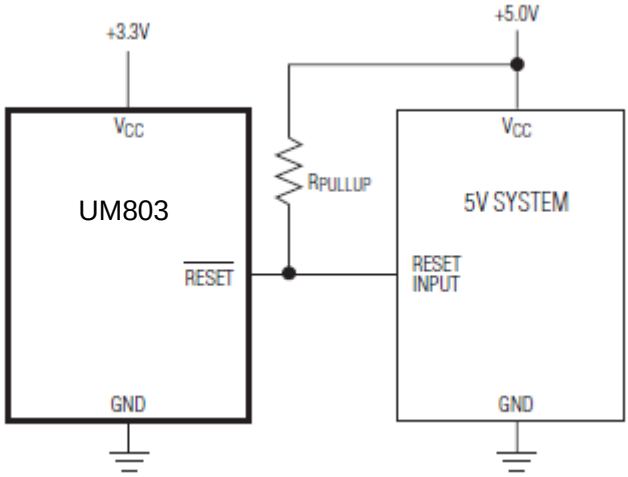


Figure 3. UM803 Open-Drain $\overline{\text{RESET}}$ Output Allows Use with Multiple Supplies

Benefits of Highly Accurate Reset Threshold

Most µP supervisor circuits have reset threshold voltages between 5% and 10% below the value of nominal supply voltages. This ensures a reset will not occur within 5% of the nominal supply, but will occur when the supply is 10% below nominal.

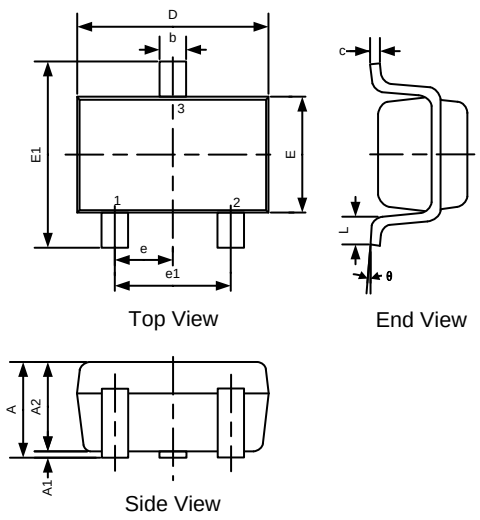
When using ICs rated at only the nominal supply ±5%, this leaves a zone of uncertainty where the supply is between 5% and 10% low, and where the reset may or may not be asserted.

The UM803L_/T_/Z_ use highly accurate circuitry to ensure that reset is asserted close to the 5% limit, and long before the supply has declined to 10% below nominal.

Package Information

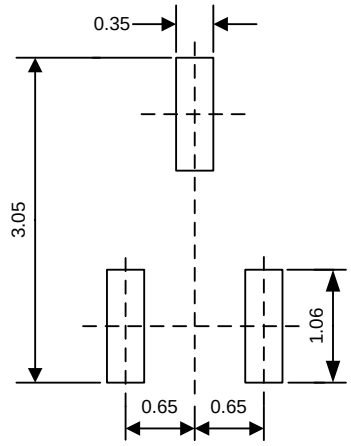
UM803 SOT323

Outline Drawing



DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	0.90	-	1.10	0.035	-	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.90	-	1.00	0.035	-	0.039
b	0.20	0.30	0.40	0.008	0.012	0.016
c	0.08	-	0.18	0.003	-	0.007
D	1.80	2.15	2.20	0.071	0.085	0.087
E	1.15	1.30	1.35	0.045	0.051	0.053
E1	2.00	-	2.45	0.079	-	0.096
e	0.65BSC			0.026BSC		
e1	1.20	1.30	1.40	0.047	0.051	0.055
L	0.25	-	0.46	0.010	-	0.018
θ	0°	-	8°	0°	-	8°

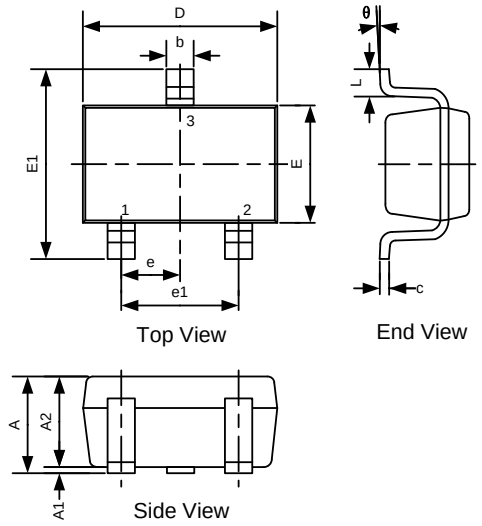
Land Pattern



NOTES:
1. Compound dimension: 2.15×1.30.
2. Unit: mm.
3. General tolerance ±0.05mm unless otherwise specified.
4. The layout is just for reference.

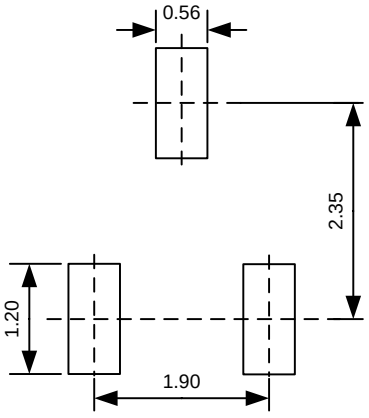
UM803 SOT23-3

Outline Drawing



DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	1.013	1.15	1.40	0.040	0.045	0.055
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	1.00	1.10	1.30	0.039	0.043	0.051
b	0.30	-	0.50	0.012	-	0.020
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.82	-	3.10	0.111	-	0.122
E	1.50	1.60	1.70	0.059	0.063	0.067
E1	2.60	2.80	3.00	0.102	0.110	0.118
e	0.95REF			0.037REF		
e1	1.90REF			0.075REF		
L	0.30	-	0.60	0.012	-	0.024
θ	0°	-	8°	0°	-	8°

Land Pattern

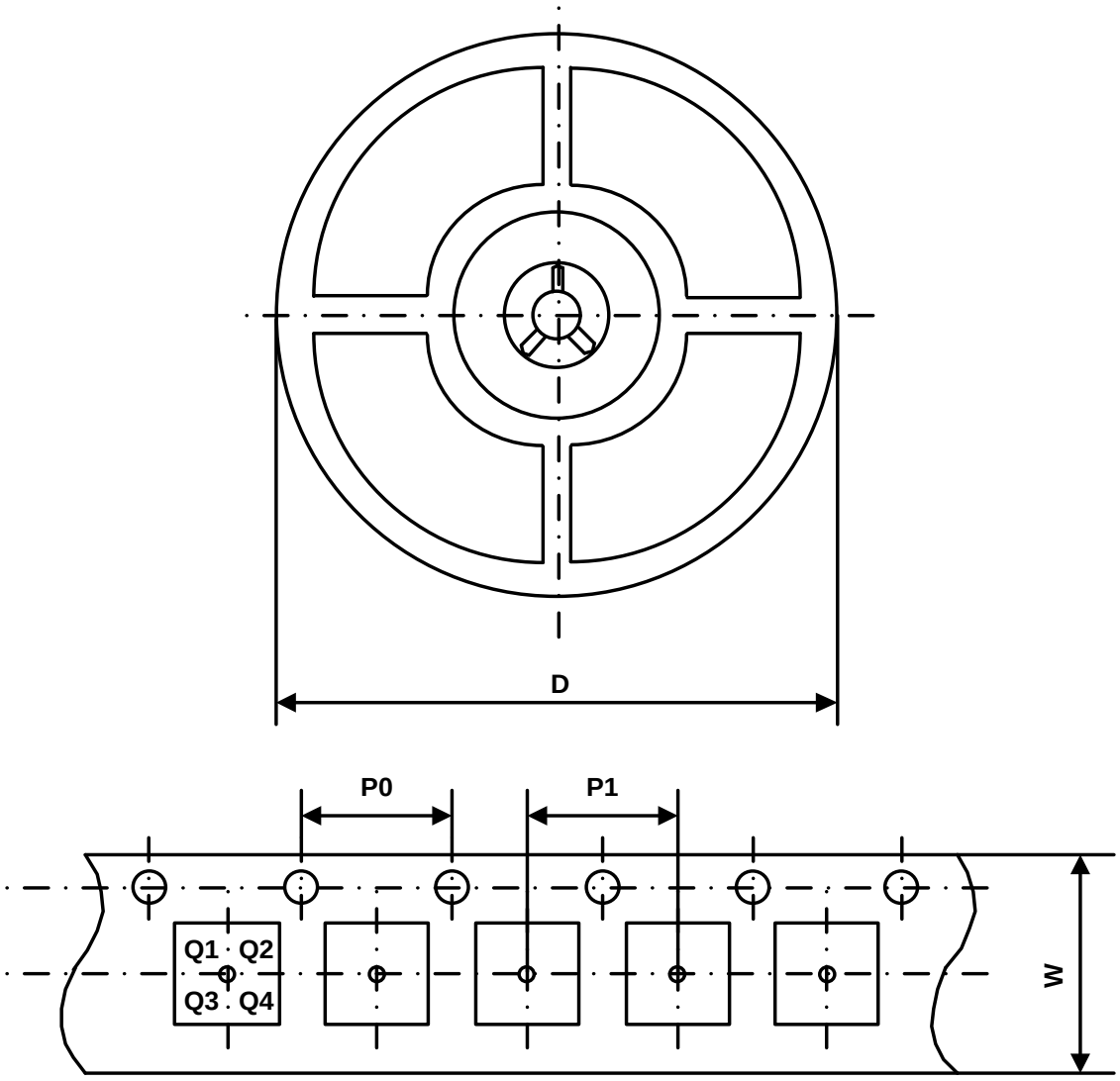


NOTES:
1. Compound dimension: 2.92×1.60;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Selection Table

Part Number	RESET Threshold (V)	Timeout Period (ms)	Output Type	Marking Code	Package Type	Shipping Qty
UM803LP	4.63	240	Open-Drain, Active Low	VLE	SOT323	3000pcs/7Inch Tape & Reel
UM803MP	4.38	240	Open-Drain, Active Low	VME		
UM803JP	4.00	240	Open-Drain, Active Low	VJE		
UM803TP	3.08	240	Open-Drain, Active Low	VTE		
UM803SP	2.93	240	Open-Drain, Active Low	VSE		
UM803RP	2.63	240	Open-Drain, Active Low	VRE		
UM803ZP	2.32	240	Open-Drain, Active Low	VZE		
UM803LS	4.63	240	Open-Drain, Active Low	03L	SOT23-3	3000pcs/7Inch Tape & Reel
UM803MS	4.38	240	Open-Drain, Active Low	03M		
UM803JS	4.00	240	Open-Drain, Active Low	03J		
UM803TS	3.08	240	Open-Drain, Active Low	03T		
UM803SS	2.93	240	Open-Drain, Active Low	03S		
UM803RS	2.63	240	Open-Drain, Active Low	03R		
UM803ZS	2.32	240	Open-Drain, Active Low	03Z		
UM803LSR	4.63	240	Open-Drain, Active Low	3LR	SOT23-3	3000pcs/7Inch Tape & Reel
UM803MSR	4.38	240	Open-Drain, Active Low	3MR		
UM803JSR	4.00	240	Open-Drain, Active Low	3JR		
UM803TSR	3.08	240	Open-Drain, Active Low	3TR		
UM803SSR	2.93	240	Open-Drain, Active Low	3SR		
UM803RSR	2.63	240	Open-Drain, Active Low	3RR		
UM803ZSR	2.32	240	Open-Drain, Active Low	3ZR		

Packing Information



Part Number	Package Type	Carrier Width (W)	Pitch (P0)	Pitch (P1)	Reel Size (D)	PIN 1 Quadrant
UM803xP	SOT323	8 mm	4 mm	4 mm	180 mm	Q3
UM803xS	SOT23-3	8 mm	4 mm	4 mm	180 mm	Q3
UM803xSR	SOT23-3	8 mm	4 mm	4 mm	180 mm	Q3

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