带有看门狗定时器及手动复位输入的电压监控电路

UM823/824/825 *SOT23-5/SOT353*

描述

UM823/824/825系列是经济高效的系统电源监控电路，专为数字系统电源监控设计。该系列提供电路初始化和定时监控功能，并集成了看门狗监控电路和手动复位输入功能。与单独的IC或分立元件相比，这些器件显著提高了系统的可靠性和准确性。

UM823/824/825经过专门设计，可忽略V_{CC}上的快速瞬变，并提供七个预设的复位阈值电压。三款器件都具有低电平有效复位输出，确保在V_{CC}低至1V时处于正确的状态。UM823还提供看门狗输入和手动复位输入。UM824提供看门狗输入和互补的高电平有效复位。UM825提供手动复位输入和互补的高电平有效复位。

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

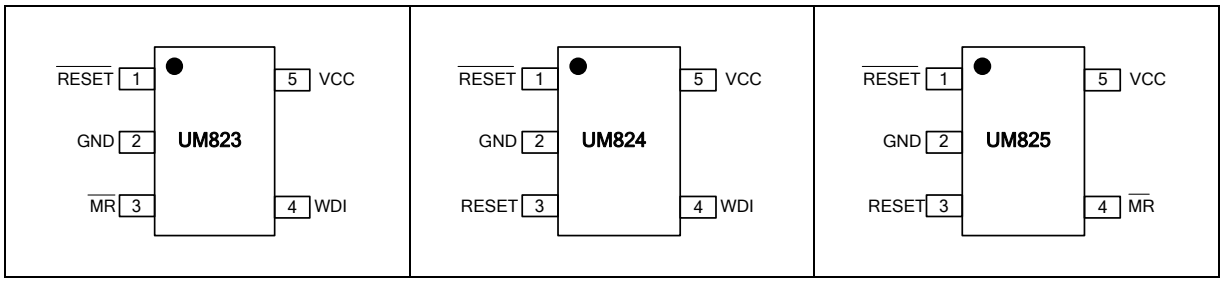
特性

- 宽电源电压范围：1V 至 5.5V
- 确保 V_{CC}=1V 时的正确逻辑输出
- 对 2.19V、 2.63V、 2.93V、 3.08V、 4.38V、4.63V 电源进行精确电压监控
- 复位脉冲宽度：200ms
- 1.6s 超时的独立看门狗定时器
- 工作电流：
  4μA（L/M 版本）
  3μA（T/S/R/Z/Y 版本）
- 工作温度范围：-40℃ 至+85℃
- 电源瞬变抗扰度
- SOT23-5 和 SOT353 封装

选型指南

Function	UM823	UM824	UM825
Active-Low Reset	√	√	√
Active-High Reset	-	√	√
Watchdog Input	√	√	-
Manual Reset Input	√	-	√

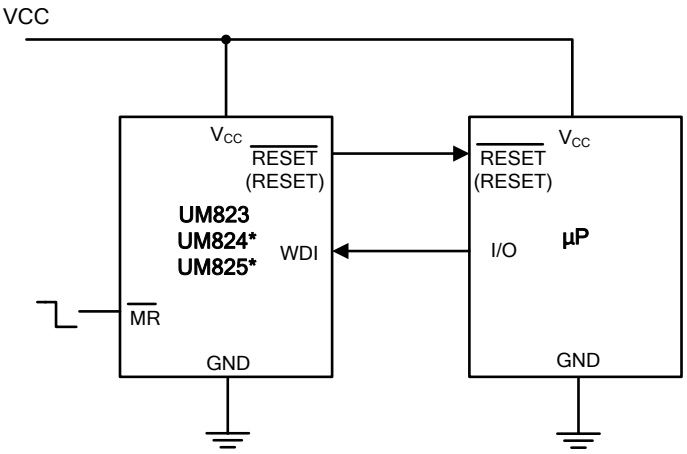
引脚配置



Ordering Information

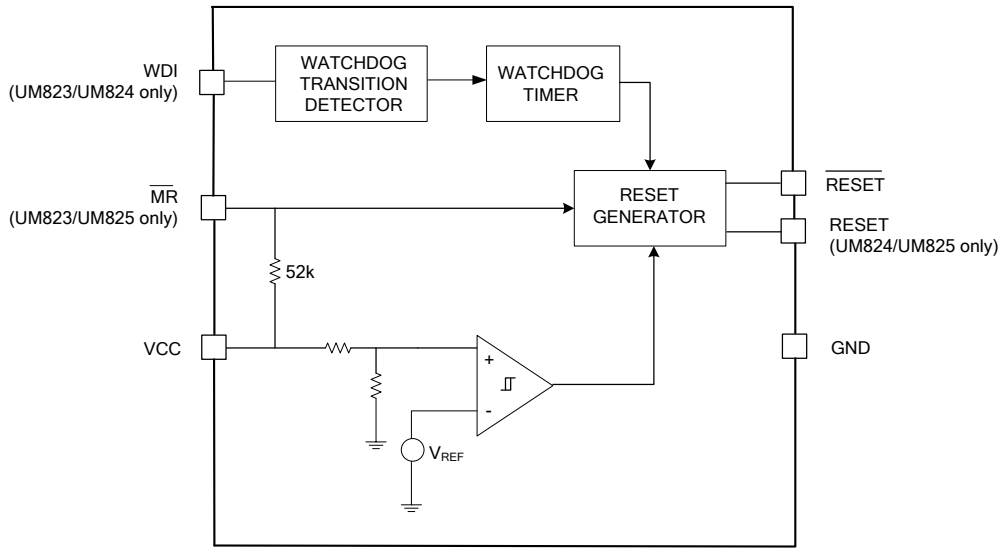
UM8 XX Z P
Z: Reset Threshold (V)
=L 4.63
=M 4.38
=T 3.08
=S 2.93
=R 2.63
=Z 2.32
=Y 2.19
P: Package Type
=S SOT23-5
=P SOT353

Typical Operating Circuit



UM824 has no $\overline{MR}$ and UM825 has no WDI

Functional Diagram



Pin Description

Pin Name	Function
GND	Ground Reference for all signals.
$\overline{\text{RESET}}$	Active-Low Reset Output. Pulses low for 200ms when triggered, and remains low whenever V_{CC} is below the reset threshold or when $\overline{MR}$ is a logic low. It remains low for 200ms after one of the following occurs: V_{CC} rises above the reset threshold, the watchdog triggers a reset, or $\overline{MR}$ goes low to high.
RESET	Active-High Reset Output. Inverse of $\overline{\text{RESET}}$.
$\overline{MR}$	Manual-Reset Input triggers a reset pulse when pulled below $0.3V_{CC}$. The active-low input has an internal 52kΩ pull-up resistor. It can be driven from a TTL or CMOS logic line as well as shorted to ground with a switch. Leave open or connect to V_{CC} if unused.
WDI	Watchdog Input. If WDI remains either high or low for longer than the watchdog timeout period, the internal watchdog timer runs out and a reset is triggered. The internal watchdog timer clears whenever reset is asserted, or whenever WDI sees a rising or falling edge. If WDI is left unconnected or is connected to a three-stated buffer output, the watchdog feature is disabled.
V_{CC}	Supply Voltage

Absolute Maximum Ratings (Note 1)

Symbol	Parameter		Value	Unit
V_{CC}	Supply Voltage		-0.3 to +6.0	V
	RESET, $\overline{\text{RESET}}$, $\overline{MR}$, WDI		-0.3 to (V_{CC}+0.3)	
I_{CC}	Input Current, V_{CC}, $\overline{MR}$, WDI		20	mA
I_O	Output Current, RESET, $\overline{\text{RESET}}$		20	mA
P_D	Continuous Power Dissipation	SOT23-5	300	mW
		SOT353	247	
T_A	Operating Temperature Range		-40 to +85	℃
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.

ESD Ratings

Symbol	ESD Mode	Value	Unit
HBM	Human Body Mode	±2000	V
CDM	Charged Device Mode	±500	

Electrical Characteristics

(V_{CC}=4.75V to 5.5V for L version, V_{CC}=4.5V to 5.5V for M version, V_{CC}=3.15V to 3.6V for T version, V_{CC}=3.0V to 3.6V for S version, V_{CC}=2.7V to 3.6V for R version, V_{CC}=2.38V to 2.75V for Z version, V_{CC}=2.25V to 2.75V for Y version, T_A=-40℃ to +85℃ (SOT353), T_A=-40℃ to +125℃(SOT23-5),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
		T_A=T_{MIN} to T_{MAX}		1.2		5.5	V
I_{CC}	Supply Current	WDI and MR unconnected	UM823L/M UM824L/M		4	6	μA
			UM823T/S/R/Z/Y UM824T/S/R/Z/Y		3	6	
		MR unconnected	UM825L/M		4	6	
			UM825T/S/R/Z/Y		3	6	
V_{TH+}	Reset Threshold	L Version	T_A=+25℃	4.56	4.63	4.70	V
			T_A=T_{MIN} to T_{MAX}	4.50		4.75	
		M Version	T_A=+25℃	4.31	4.38	4.45	
			T_A=T_{MIN} to T_{MAX}	4.25		4.50	
		T Version	T_A=+25℃	3.04	3.08	3.11	
			T_A=T_{MIN} to T_{MAX}	3.00		3.15	
		S Version	T_A=+25℃	2.89	2.93	2.96	
			T_A=T_{MIN} to T_{MAX}	2.85		3.00	
		R Version	T_A=+25℃	2.59	2.63	2.66	
			T_A=T_{MIN} to T_{MAX}	2.55		2.70	
		Z Version	T_A=+25℃	2.28	2.32	2.35	
			T_A=T_{MIN} to T_{MAX}	2.25		2.38	
		Y Version	T_A=+25℃	2.16	2.19	2.22	
			T_A=T_{MIN} to T_{MAX}	2.13		2.25	
	Reset Threshold Hysteresis	L/M			20		mV
		T/S/R/Z/Y			10		
	Reset Threshold Tempco				100		ppm/℃
t_{RP}	Reset Timeout Period			140	200	320	ms
	V_{CC} to $\overline{RESET}$ Delay	V_{RST}-V_{CC}=100mV			20		μs

Electrical Characteristics (Continued)

(V_{CC}=4.75V to 5.5V for L version, V_{CC}=4.5V to 5.5V for M version, V_{CC}=3.15V to 3.6V for T version, V_{CC}=3.0V to 3.6V for S version, V_{CC}=2.7V to 3.6V for R version, V_{CC}=2.38V to 2.75V for Z version, V_{CC}=2.25V to 2.75V for Y version, T_A=-40℃ to +85℃ (SOT353), T_A=-40℃ to +125℃(SOT23-5),unless otherwise noted. Typical values are at T_A=+25℃.) (Note 2)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OH}	$\overline{RESET}$ RESET Output Voltage	UM82_L /M V_{CC}=V_{RST} max I_{SOURCE}=120uA	V_{CC}-1.5			V
		UM82_T/ S /R/Z /YV_{CC}=V_{RST} max I_{SOURCE}=30uA	0.8V_{CC}			
V_{OL}		UM82_L /M V_{CC}=V_{RST} min I_{SINK}=3.2mA			0.4	
		UM82_T/ S /R/Z /YV_{CC}= V_{RST} min I_{SINK}=1.2mA			0.3	
WATCHDOG INPUT(UM823/824)						
t_{WD}	Watchdog Timeout Period		1.12	1.60	2.40	s
t_{WDI}	WDI Pulse Width	V_{IL}<0.15V_{CC} , V_{IH}>0.85V_{CC}	50			ns
V_{IL}	WDI Input Voltage (Note 4)				0.15V_{CC}	V
V_{IH}			0.85V_{CC}			
	WDI Input Current	WDI=V_{CC}	1		20	μA
		WDI=GND	-20		-1	
MANUAL RESET INPUT(UM823/825)						
V_{IL}	$\overline{MR}$ Input Voltage				0.15V_{CC}	V
V_{IH}			0.85V_{CC}			
	$\overline{MR}$ Pulse Width		1.0			μs
	$\overline{MR}$ Noise Immunity(Pulse width with no reset)			100		ns
	$\overline{MR}$ to Reset Delay			500		ns
	$\overline{MR}$ Pullup Resistamce(internal)		35	52	75	kΩ

Note 2: Over temperature limits are guaranteed by design and not production tested.

Note 3: The $\overline{RESET}$ short-circuit current is the maximum pullup current when $\overline{RESET}$ is driven low by a μP bidirectional reset pin.

Note 4: WDI is internally serviced within the watchdog period if WDI is left unconnected.

Detailed Description

$\overline{\text{RESET}}$ Output

A Microprocessor's reset input starts the µP in a known state. The UM823/824/825 µP supervisory circuits assert a reset to prevent code-execution errors during power-up, power-down, and brownout conditions. $\overline{\text{RESET}}$ is guaranteed to be a logic low for VCC down to 1V. Once VCC exceeds the reset threshold, an internal timer keeps $\overline{\text{RESET}}$ low for the specified reset timeout period, after this interval, $\overline{\text{RESET}}$ returns high.
If a brownout condition occurs(VCC dips below reset threshold), $\overline{\text{RESET}}$ goes low. Each time $\overline{\text{RESET}}$ is asserted it stays low for the reset timeout period. Any time VCC goes below the reset threshold the internal timer restarts. $\overline{\text{RESET}}$ both sources and sinks current, RESET on the UM824/825 is the inverse of $\overline{\text{RESET}}$.

Manual Reset Input (UM823/825)

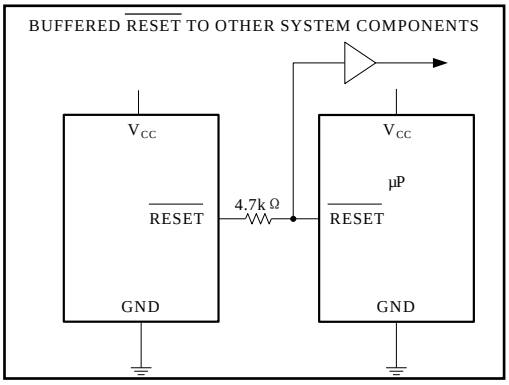
Many µP-based products require manual reset capability allowing the operator, a test technician, or external logic circuitry to initiate a reset. On the UM823/825, a logic low on $\overline{\text{MR}}$ asserts reset. Reset remains asserted while $\overline{\text{MR}}$ is low, and for t_{RP} (200ms nominal) after it returns high. $\overline{\text{MR}}$ has an internal 52kΩ pull up resistor, so it can be left open if not used. This input can be driven with CMOS logic levels or with open-drain/collector outputs. Connect a normally open momentary switch from $\overline{\text{MR}}$ to GND to create a manual-reset function; external debounce circuitry is not required. If $\overline{\text{MR}}$ is driven from long cables or the device is used in a noisy environment, connect a 0.1µF capacitor from $\overline{\text{MR}}$ to GND to provide additional noise immunity.

Watchdog Input (UM823/824)

In the UM823/824, the watchdog circuit monitors the µP's activity. If the µP does not toggle the watchdog input (WDI) within t_{WD}(1.6s), reset asserts. The internal 1.6s timer is cleared by either a reset pulse or by toggling WDI, which detects pulses as short as 50ns. While reset is asserted, the timer remains cleared and does not count. As soon as reset is released, the timer starts counting.
Disable the watchdog function by leaving WDI unconnected or by three-stating the driver connected to WDI.

Microprocessor with Bidirectional Reset

To prevent contention for microprocessor 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 the figure below.

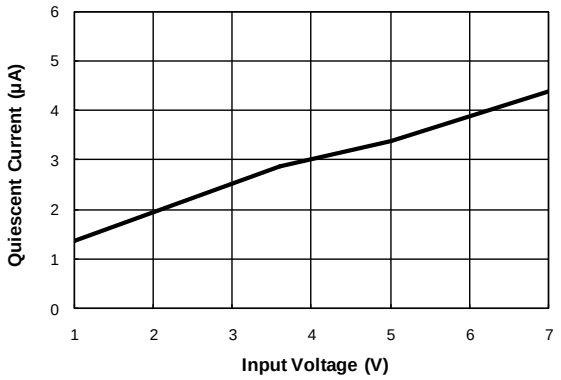


Bidirectional Reset I/O

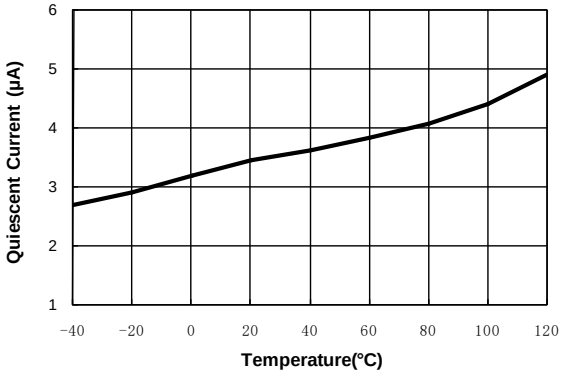
Typical Operating Characteristics

V_{CC}=+5V, T_A=25℃,unless otherwise noted.

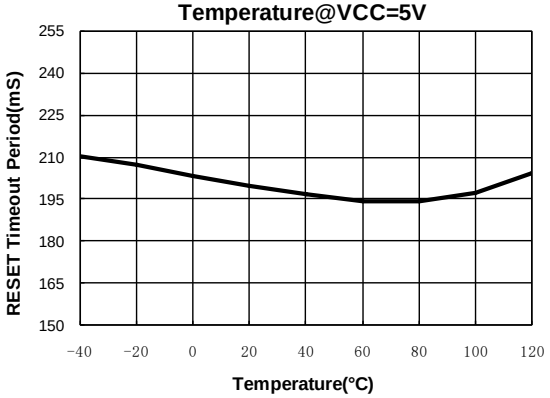
Quiescent Current vs. Input Voltage@Ta=20°C



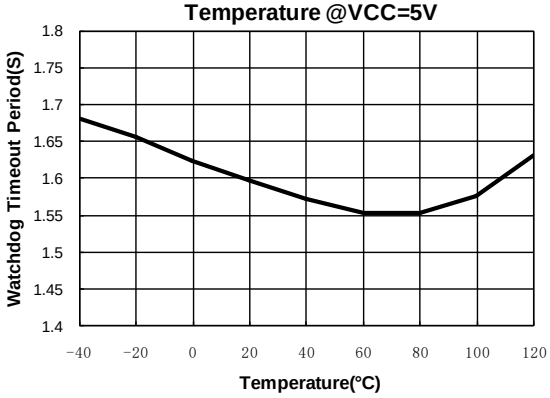
Quiescent Current vs. Temperature @VCC=5V



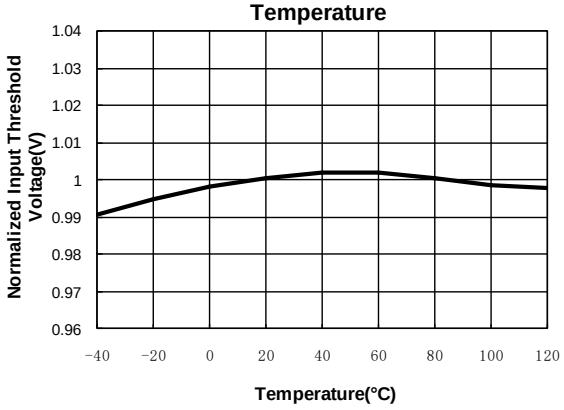
RESET Timeout Period vs. Temperature@VCC=5V



Watchdog Timeout Period vs. Temperature @VCC=5V



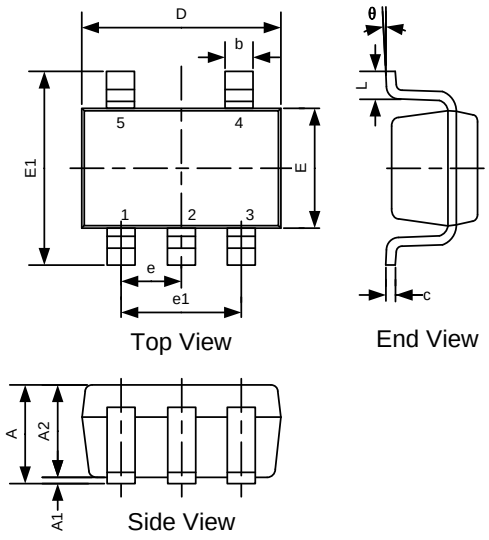
Normalized Input Threshold Voltage vs. Temperature



Package Information

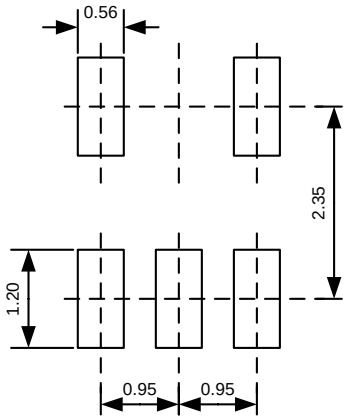
UM823S/824S/825S SOT23-5

Outline Drawing



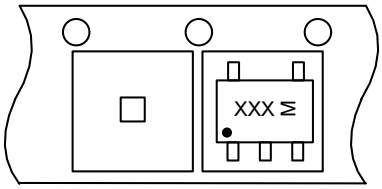
Symbol	DIMENSIONS					
	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	1.013	1.15	1.40	0.040	0.045	0.055
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	1.00	1.10	1.30	0.039	0.043	0.051
b	0.30	-	0.50	0.012	-	0.020
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.82	-	3.10	0.111	-	0.122
E	1.50	1.60	1.70	0.059	0.063	0.067
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



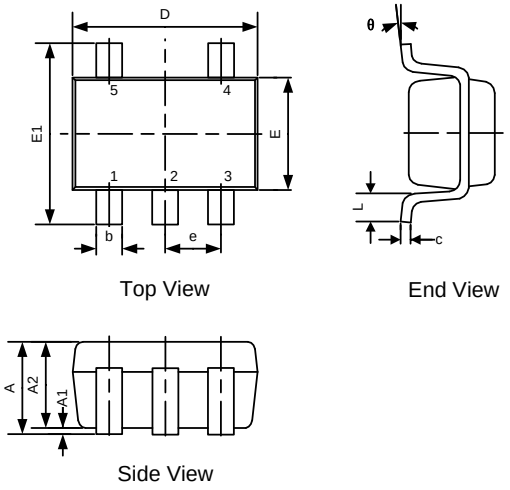
NOTES:
1. Compound dimension: 2.92×1.60;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



UM823P/824P/825P SOT353

Outline Drawing



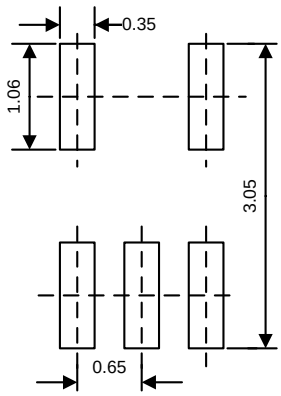
Top View

End View

Side View

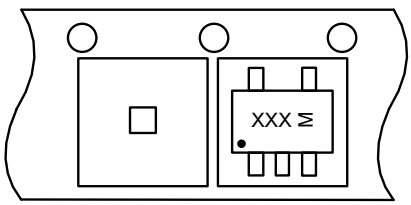
DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	0.85	-	1.10	0.033	-	0.043
A1	0.00	-	0.10	0.000	-	0.004
A2	0.80	-	1.00	0.031	-	0.039
b	0.10	-	0.35	0.004	-	0.014
c	0.08	-	0.22	0.003	-	0.009
D	1.80	2.15	2.20	0.071	0.085	0.087
E	1.15	1.30	1.35	0.045	0.051	0.053
E1	2.00	-	2.45	0.079	-	0.096
e	0.65BSC			0.026REF		
L	0.25	-	0.46	0.010	-	0.018
θ	0°	-	8°	0°	-	8°

Land Pattern

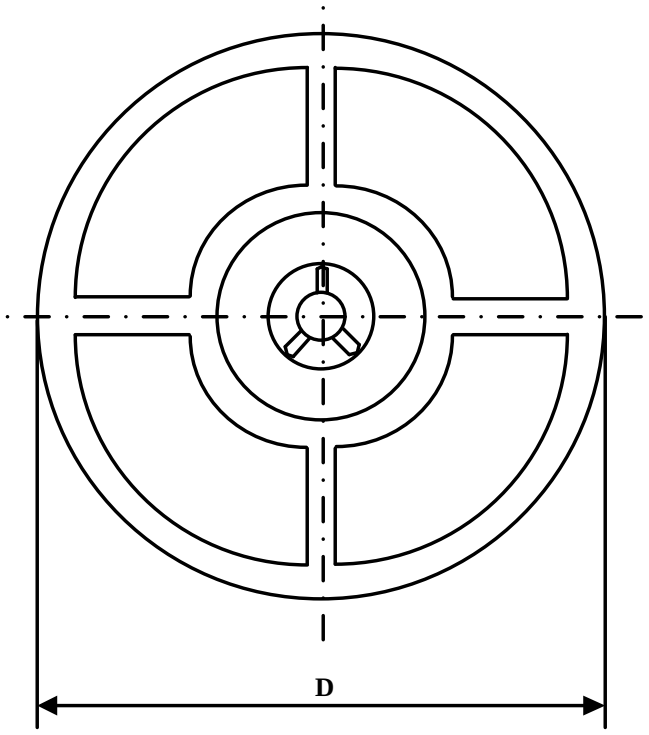


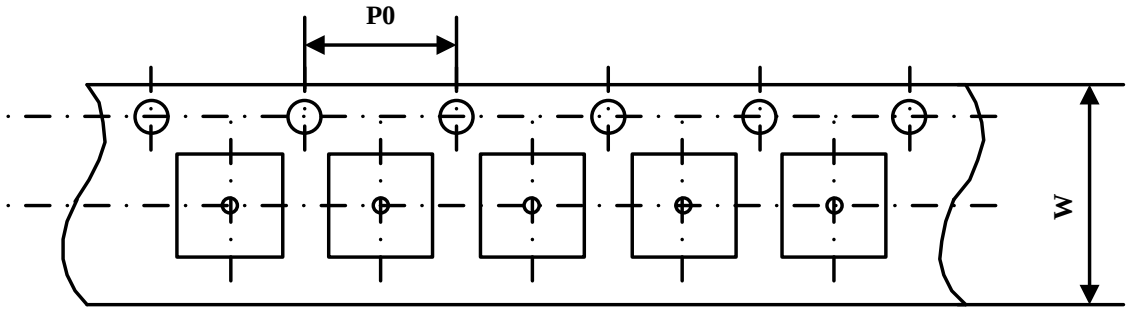
NOTES:
1. Compound dimension: 2.15×1.30;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



Packing Information





Part Number	Package Type	Carrier Width(W)	Pitch(P0)	Reel Size(D)
UM823S	SOT23-5	8 mm	4 mm	180 mm
UM824S	SOT23-5	8 mm	4 mm	180 mm
UM825S	SOT23-5	8 mm	4 mm	180 mm
UM823P	SOT353	8 mm	4 mm	180 mm
UM824P	SOT353	8 mm	4 mm	180 mm
UM825P	SOT353	8 mm	4 mm	180 mm

Selection Table

Part Number	RESET Threshold (V)	Top Marking	Package Type	Shipping Quantity
UM823LS	4.63	23L	SOT23-5	3000pcs/7Inch Tape Reel
UM823MS	4.38	23M		
UM823TS	3.08	23T		
UM823SS	2.93	23S		
UM823RS	2.63	23R		
UM823ZS	2.32	23Z		
UM823YS	2.19	23Y		
UM823LP	4.63	3LP	SOT353	3000pcs/7Inch Tape Reel
UM823MP	4.38	3MP		
UM823TP	3.08	3TP		
UM823SP	2.93	3SP		
UM823RP	2.63	3RP		
UM823ZP	2.32	3ZP		
UM823YP	2.19	3YP		
UM824LS	4.63	24L	SOT23-5	3000pcs/7Inch Tape Reel
UM824MS	4.38	24M		
UM824TS	3.08	24T		
UM824SS	2.93	24S		
UM824RS	2.63	24R		
UM824ZS	2.32	24Z		
UM824YS	2.19	24Y		
UM824LP	4.63	4LP	SOT353	3000pcs/7Inch Tape Reel
UM824MP	4.38	4MP		
UM824TP	3.08	4TP		
UM824SP	2.93	4SP		
UM824RP	2.63	4RP		
UM824ZP	2.32	4ZP		
UM824YP	2.19	4YP		
UM825LS	4.63	25L	SOT23-5	3000pcs/7Inch Tape Reel
UM825MS	4.38	25M		
UM825TS	3.08	25T		
UM825SS	2.93	25S		
UM825RS	2.63	25R		
UM825ZS	2.32	25Z		
UM825YS	2.19	25Y		
UM825LP	4.63	5LP	SOT353	3000pcs/7Inch Tape Reel
UM825MP	4.38	5MP		
UM825TP	3.08	5TP		
UM825SP	2.93	5SP		
UM825RP	2.63	5RP		
UM825ZP	2.32	5ZP		
UM825YP	2.19	5YP		

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