3-Pin Microprocessor Reset Circuits
UM803 *SOT323/SOT23-3*

General Description

The UM803 is a microprocessor (μP) supervisory circuit used to monitor the power supplies in μP and digital systems. It provides excellent circuit reliability and low cost by eliminating external components and adjustments when used with +5V, +3.3V, +3.0V or +2.5V powered circuits.
The circuit performs a single function: 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. Reset thresholds suitable for operation with a variety of supply voltages are available.

The UM803 has an open-drain output stage. The UM803's open-drain $\overline{\text{RESET}}$ output requires a pull-up resistor that can be connected to a voltage higher than V_{CC}. The UM803 has an active-low $\overline{\text{RESET}}$ output. The reset comparator is designed to ignore fast transients on V_{CC}, and the outputs are guaranteed to be in the correct logic state for V_{CC} down to 1V.
Low supply current makes the UM803 ideal for use in portable equipment. The UM803 is available in a 3-pin SOT323 and SOT23 package.

Applications

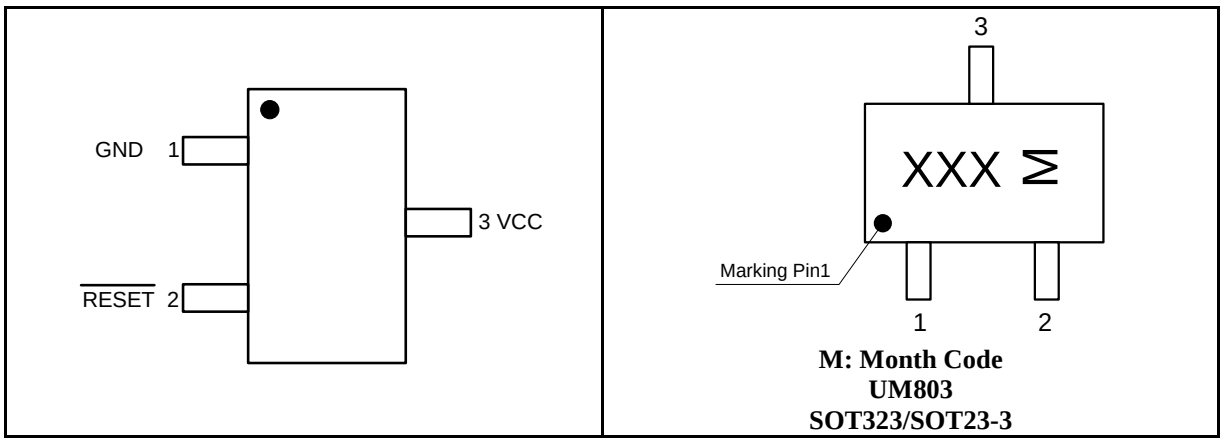
- Computers
- Controllers
- Portable/Battery-Powered Equipments
- Intelligent Instruments
- Critical μP and μC Power Monitoring
- Automotive

Features

- No External Components
- Power Supply Transient Immunity
- Guaranteed Reset Valid to V_{CC}=+1V
- Precision V_{CC} Monitoring of +2.5V, +3V, +3.3V and +5V Supplies
- Fully Specified Over Temperature
- 2μA Supply Current
- 140ms Minimum Power-On Reset Pulse Width
- Available in One Output Configuration:
  Open-Drain Active-Low $\overline{\text{RESET}}$ Output
- 3-Pin SOT323 and SOT23 Packages
- Wide Operation Temperature: -40℃ to +85℃

Pin Configurations

Top View

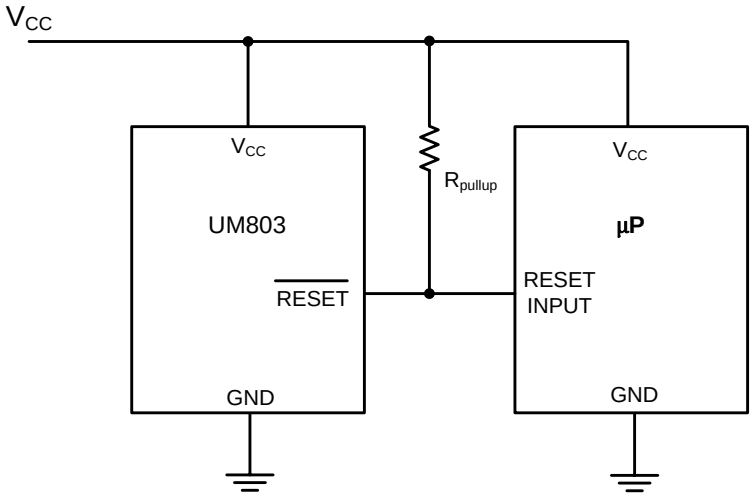


M: Month Code
UM803
SOT323/SOT23-3

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 Number	Pin Name	Function
1	GND	Ground
2	$\overline{\text{RESET}}$	$\overline{\text{RESET}}$ Output remains low while V_{CC} is below the reset threshold, and for at least 140ms after V_{CC} rises above the reset threshold.
3	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)

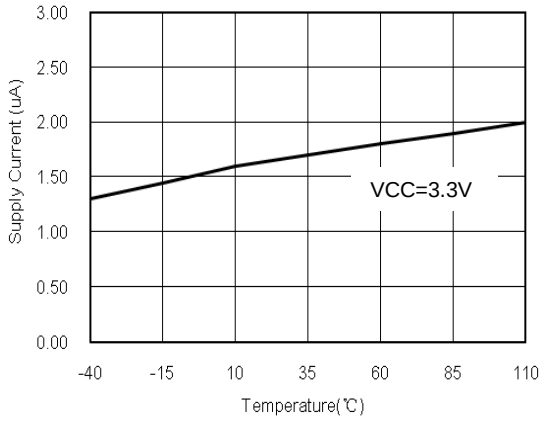
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CC}	Supply Voltage Range	T_A=0℃ to + 70℃		1.0		5.5	V
I_{CC}	Supply Current				2.0		μA
V_{TH}	Reset Threshold	L version	T_A=+25℃	4.56	4.63	4.70	V
			T_A=-40℃ to + 85℃	4.50		4.75	
		M version	T_A=+25℃	4.31	4.38	4.45	
			T_A=-40℃ to + 85℃	4.25		4.50	
		J 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.

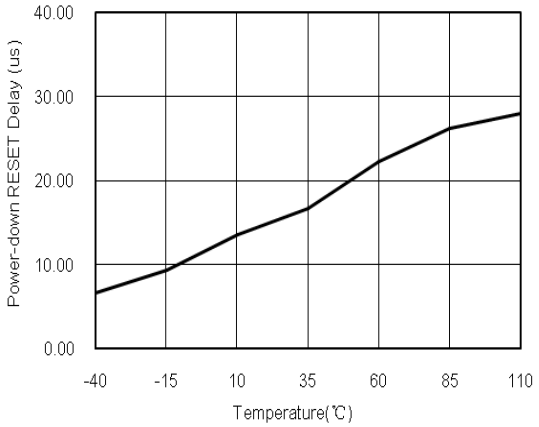
Typical Operating Characteristics

(T_A = +25℃, unless otherwise noted.)

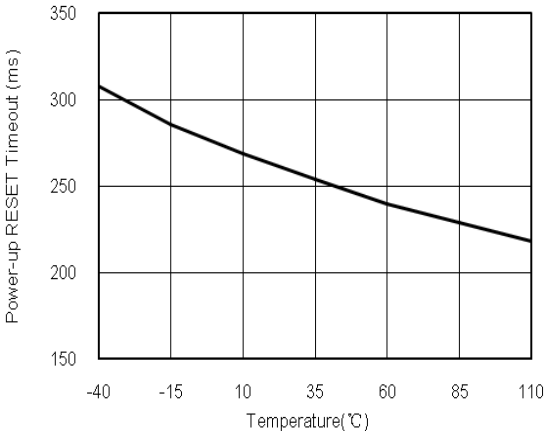
Supply Current vs. Temperature (UM803R_)



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.

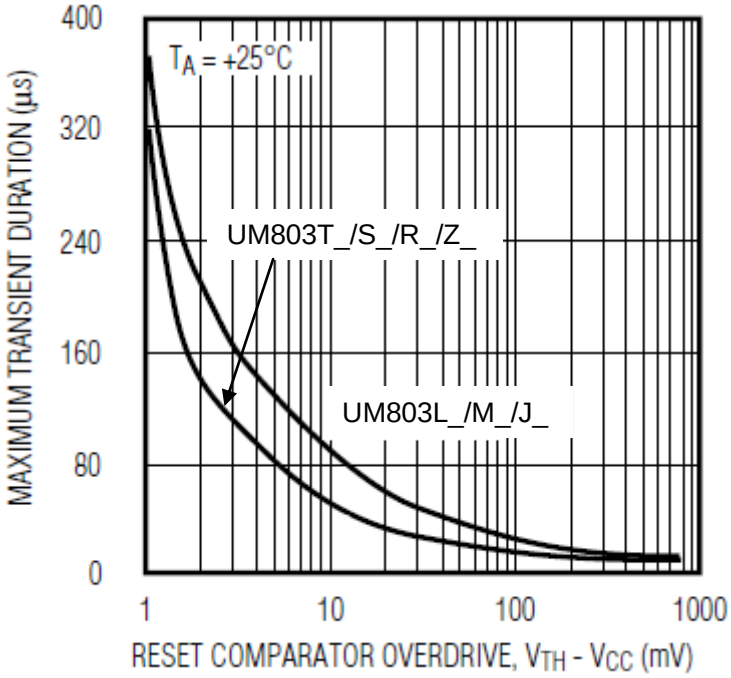


Figure 1. Maximum Transient Duration without Causing a Reset Pulse vs. Reset Comparator Overdrive

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).

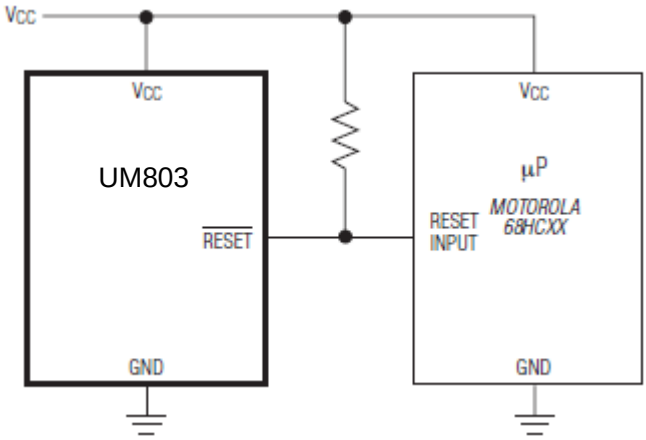


Figure 2. Interfacing to µPs with Bidirectional Reset I/O

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.

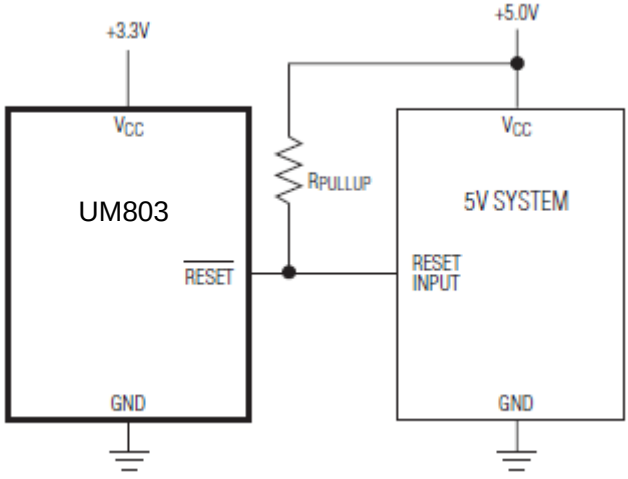


Figure 3. UM803 Open-Drain $\overline{\text{RESET}}$ Output Allows Use with Multiple Supplies

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.

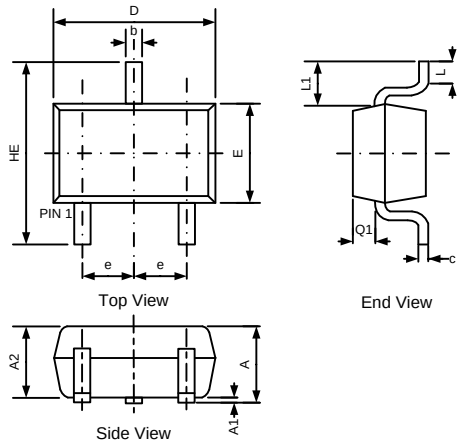
When using ICs rated at only the nominal supply ±5%, this leaves a zone of uncertainty where the supply is between 5% and 10% low, and where the reset may or may not be asserted.

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

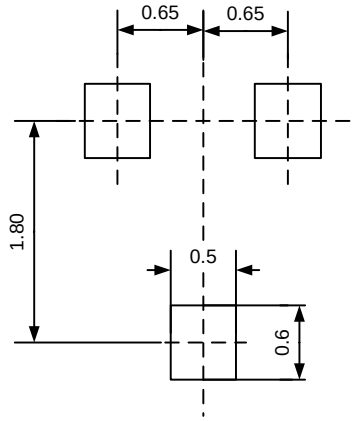
UM803 SOT323

Outline Drawing



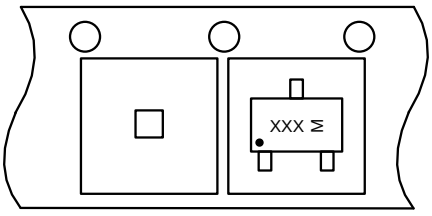
Symbol	DIMENSIONS			
	MILLIMETERS		INCHES	
	Min	Max	Min	Max
D	1.80	2.20	0.072	0.088
E	1.15	1.35	0.006	0.054
HE	1.80	2.40	0.072	0.050
b	0.25	0.40	0.010	0.016
e	0.65BSC		0.026BSC	
Q1	0.10	0.40	0.004	0.016
A	0.80	1.10	0.032	0.044
A1	0.00	0.10	0.00	0.004
A2	0.80	1.00	0.032	0.040
c	0.10	0.18	0.004	0.007
L	0.10	0.30	0.004	0.012
L1	0.425TYP		0.017TYP	

Land Pattern



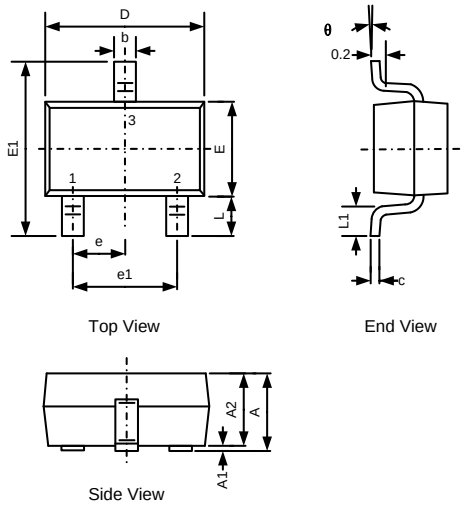
NOTES:
1. Compound dimension: 2.00×1.25;
2. Unit: mm;
3.General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



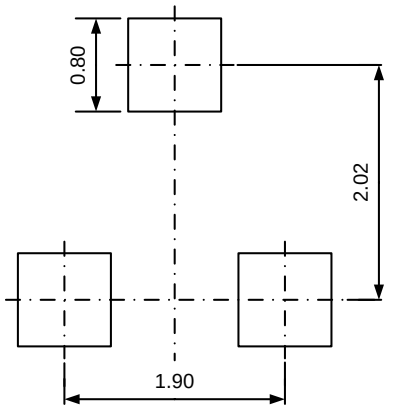
UM803 SOT23-3

Outline Drawing



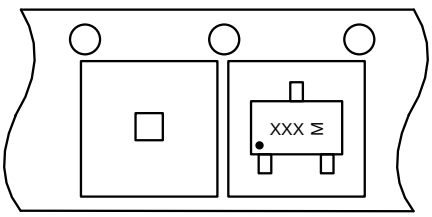
DIMENSIONS				
Symbol	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950REF		0.037REF	
e1	1.800	2.000	0.071	0.079
L	0.550REF		0.022REF	
L1	0.300	0.600	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



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		

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