

# Supply Voltage Supervisor with Watchdog and Manual Reset

## FEATURES

- Operating Voltage Range:1.0V to 5.5V
- Low Power Consumption:40μA (Max)
- Precision Supply-Voltage Monitor:  
2.63V, 2.93V, 3.08V, 4.00V
- Debounced TTL/CMOS Compatible  
Manual-Reset Input
- Guaranteed RESET Valid at V<sub>CC</sub>=1.0V
- 200ms Reset Pulse Width
- Voltage Monitor for Power-Fail or Low-Battery Warning
- Operating Temperature Range:  
-40°C to +85°C
- Available in Green Package: SOT23-5

## APPLICATIONS

- Computers
- SOC 、 DSP or Micro controllers
- Embedded Systems
- Industrial Equipment
- Intelligent Instruments
- Critical μP Power Monitoring
- Wireless Communications Systems

## DESCRIPTION

The RS806 microprocessor (μP) supervisory circuits reduce the complexity and number of components required to monitor power-supply and battery function in μP systems. This device significantly improves system reliability and accuracy compared to separate ICs or discrete components.

The RS806 provide four functions:

- 1) A reset output during power-up, power-down, and brownout conditions. The reset output remains operational with V<sub>CC</sub> as low as 1.0V.
- 2)  $\overline{\text{RESET}}$  output that goes low if the watchdog input has not been toggled within 1.6 seconds (typ).
- 3) A 1.2V threshold detector for power-fail warning, low-battery detection, or for monitoring a power supply.
- 4) An active-low manual-reset input.

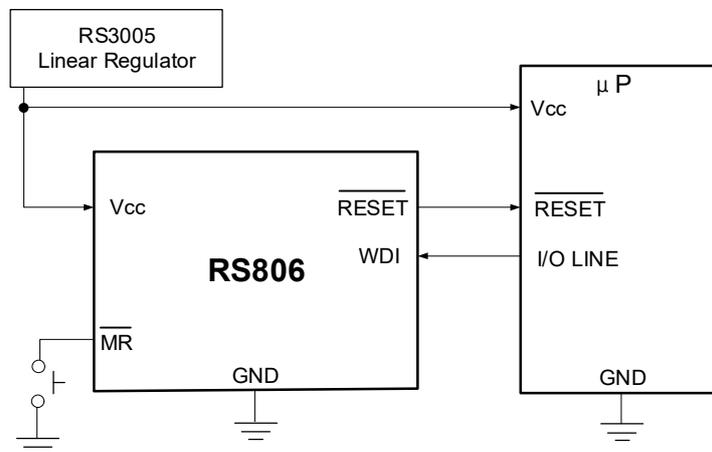
The RS806 is available in Green SOT23-5 package. It operates over an ambient temperature range of -40°C to +85°C.

Device Information <sup>(1)</sup>

PART NUMBER	PACKAGE	BODY SIZE (NOM)
RS806	SOT23-5	2.92mm x 1.60mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

## TYPICAL APPLICATION

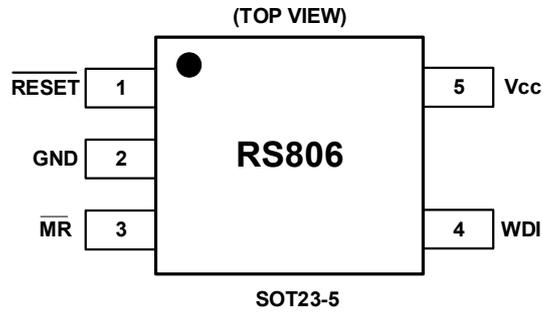


## Revision History

Note: Page numbers for previous revisions may differ from page numbers in the current version.

Version	Change Date	Change Item
A.1	2021/08/09	Initial version completed

## PIN CONFIGURATIONS



## PIN DESCRIPTION

PIN	NAME	FUNCTION
SOT23-5		
1	$\overline{\text{RESET}}$	Active-Low Reset Output pulses low for 200ms when triggered, 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 $\overline{\text{MR}}$ goes from low to high.
2	GND	Ground, reference for all signals.
3	$\overline{\text{MR}}$	Manual-Reset Input triggers a reset pulse when pulled below 0.8V. This active-low input has an internal pull-up resistance. It can be driven from a TTL or CMOS logic line as well as shorted to ground with a switch.
4	WDI	Watchdog Input. If WDI remains high or low 1.6sec, the internal watchdog timer runs out and reset 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.
5	$V_{CC}$	Power Supply Voltage that is monitored.

## Specifications

### Absolute Maximum Ratings <sup>(1)</sup>

over operating free-air temperature range (unless otherwise noted) <sup>(1)(2)</sup>

		MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage range	-0.5	6.0	V
V <sub>I</sub>	Input voltage range <sup>(2)</sup>	-0.5	6.0	V
V <sub>O</sub>	Voltage range applied to any output in the high-impedance or power-off state <sup>(2)</sup>	-0.5	6.0	V
V <sub>O</sub>	Voltage range applied to any output in the high or low state <sup>(2)(3)</sup>	-0.5	V <sub>CC</sub> +0.5	V
I <sub>IK</sub>	Input clamp current	V <sub>I</sub> <0	-20	mA
I <sub>OK</sub>	Output clamp current	V <sub>O</sub> <0	-20	mA
I <sub>O</sub>	Continuous output current		±20	mA
	Continuous current through V <sub>CC</sub> or GND		±20	mA
T <sub>J</sub>	Junction temperature	-65	150	°C
T <sub>stg</sub>	Storage temperature	-65	150	°C
T <sub>A</sub>	Operating temperature	-40	85	°C

(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 under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

(3) The value of V<sub>CC</sub> is provided in the *Recommended Operating Conditions table*.

### ESD Ratings

		VALUE	UNIT	
V <sub>(ESD)</sub>	Electrostatic discharge	Human-body model (HBM)	±6000	V
		Machine model (MM)	±300	V

### Thermal Information:

THERMAL METRIC		RS806	UNIT
		5PINS	
		SOT23-5	
R <sub>θJA</sub>	Junction-to-ambient thermal resistance	273.8	°C/W
R <sub>θJC(top)</sub>	Junction-to-case(top) thermal resistance	126.8	°C/W
R <sub>θJB</sub>	Junction-to-board thermal resistance	85.9	°C/W
Ψ <sub>JT</sub>	Junction-to-top characterization parameter	10.9	°C/W
Ψ <sub>JB</sub>	Junction-to-board characterization parameter	84.9	°C/W
R <sub>θJC(bot)</sub>	Junction-to-case(bottom) thermal resistance	N/A	°C/W

**PACKAGE/ORDERING INFORMATION**

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING <sup>(1/2)</sup>	PACKAGE OPTION
RS806	RS806-2.63YF5	-40°C ~+85°C	SOT23-5	RS806B	Tape and Reel,3000
	RS806-2.93YF5	-40°C ~+85°C	SOT23-5	RS806C	Tape and Reel,3000
	RS806-3.08YF5	-40°C ~+85°C	SOT23-5	RS806D	Tape and Reel,3000
	RS806-4.00YF5	-40°C ~+85°C	SOT23-5	RS806E	Tape and Reel,3000

## NOTE:

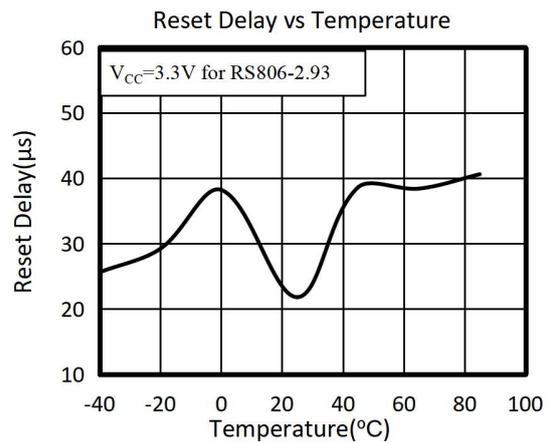
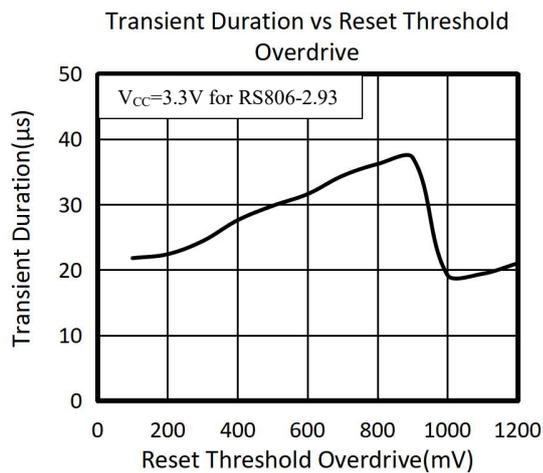
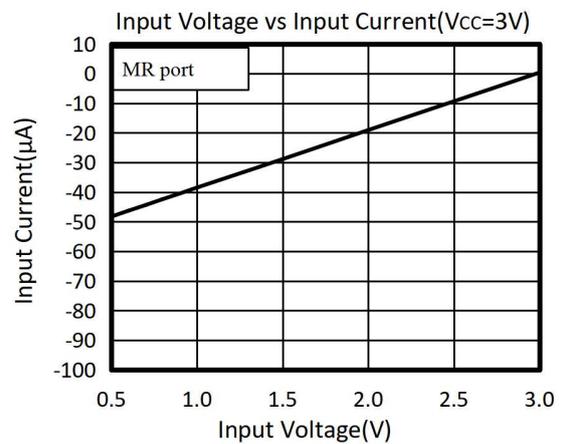
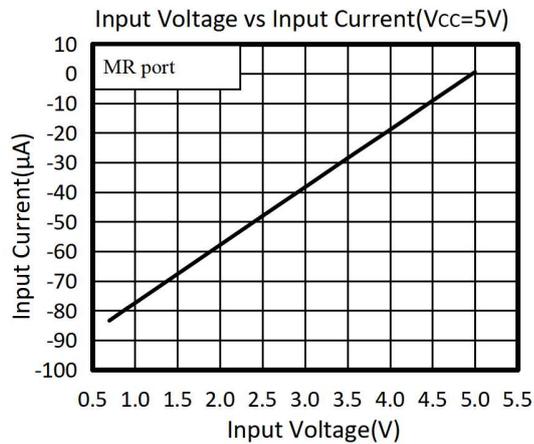
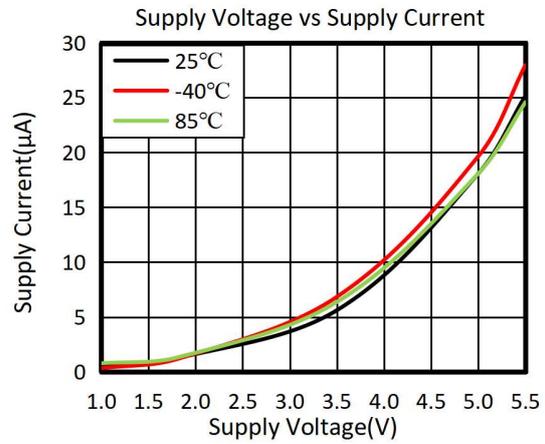
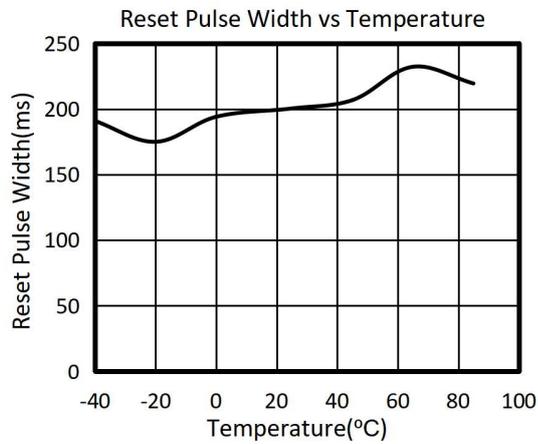
- (1) There may be additional marking, which relates to the lot trace code information(data code and vendor code), the logo or the environmental category on the device.
- (2) B,C,D,E, represents different Reset Thresholds.

## ELECTRICAL CHARACTERISTICS

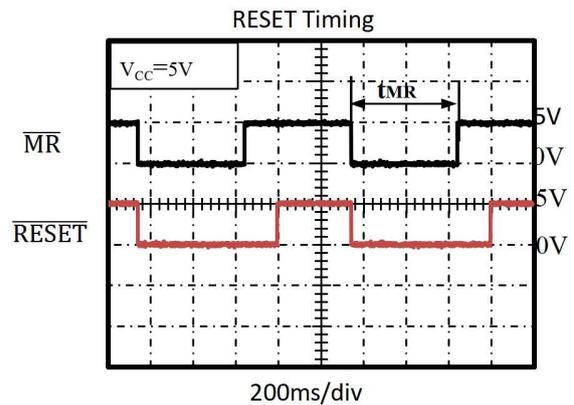
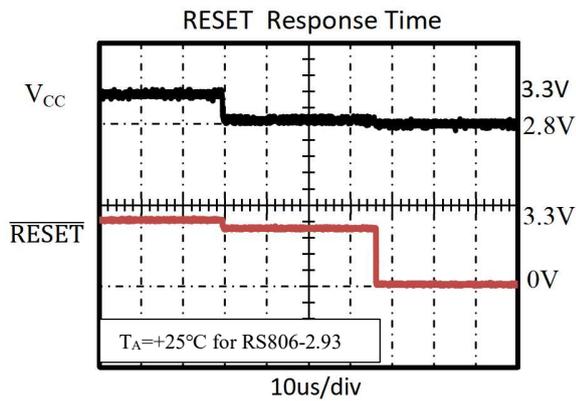
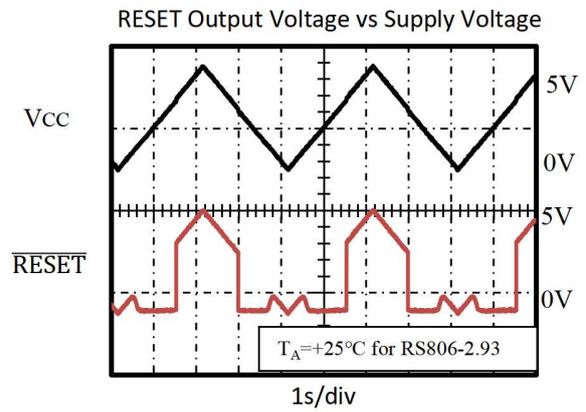
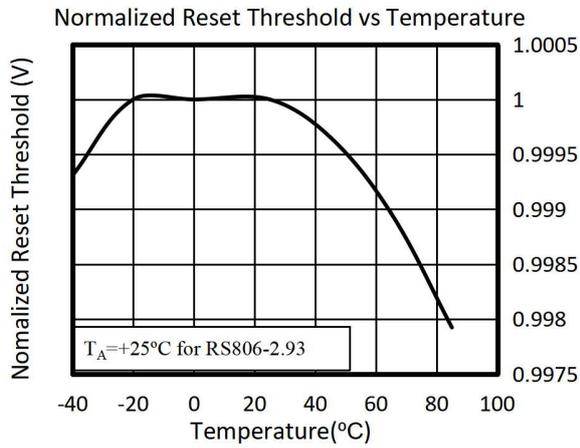
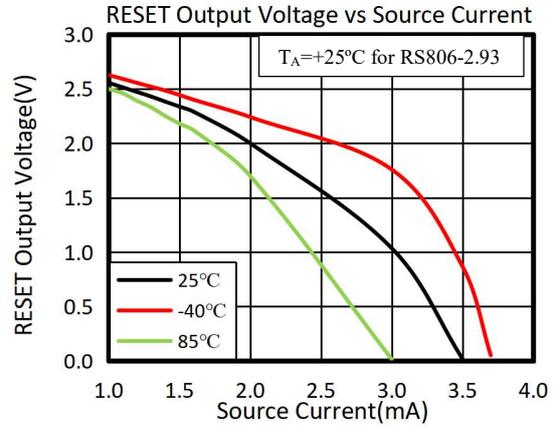
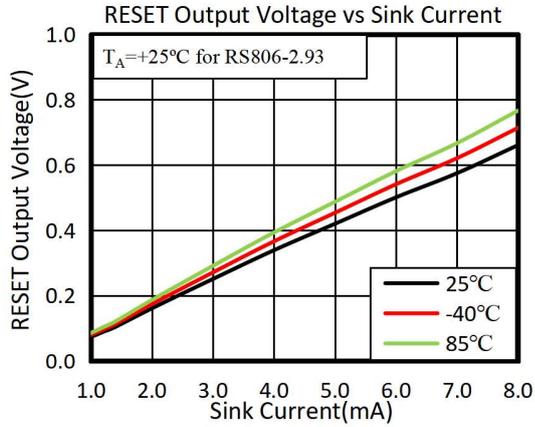
( $V_{CC} = 2.7V$  to  $5.5V$  for RS806-2.63;  $V_{CC} = 3V$  to  $5.5V$  for RS806-2.93;  $V_{CC} = 3.16V$  to  $5.5V$  for RS806-3.08;  $V_{CC} = 4.1V$  to  $5.5V$  for RS806-4.00;  $T_A = -40^{\circ}C$  to  $+85^{\circ}C$ , unless otherwise noted, typical at  $25^{\circ}C$ .) <sup>(1)</sup>

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{CC}$		1.0		5.5	V
Supply Current	$I_{SUPPLY}$			20	40	$\mu A$
Reset Threshold	$V_{RT}$	RS806-2.63	2.56	2.63	2.7	V
		RS806-2.93	2.86	2.93	3.0	
		RS806-3.08	3.0	3.08	3.16	
		RS806-4.00	3.9	4.0	4.1	
Reset Threshold Hysteresis		RS806-2.63		12		mV
		RS806-2.93		14		
		RS806-3.08		15		
		RS806-4.00		20		
Reset Pulse Width	$t_{RS}$		100	200	350	ms
$V_{CC}$ to $\overline{RESET}$ delay	$t_{RD}$	$V_{CC}=3.3V$ , RS806-2.93		30		$\mu s$
Watchdog Timeout Period	$t_{WD}$		1.0	1.6	2.9	s
WDI Pulse Width	$t_{WP}$	$V_{IL}=0.4V$ , $V_{IH}=V_{CC}$	16			ns
$\overline{RESET}$ Output voltage	High	$I_{SOURCE} = 500\mu A$	$0.7xV_{CC}$			V
	Low	$I_{SINK} = 1.2mA$			0.4	
WDI Input Threshold	High	$V_{CC}=5.0V$	4.0			V
	Low	$V_{CC}=5.0V$			0.8	
	High	$V_{RST(MAX)} < V_{CC} < 3.6V$	$0.8xV_{CC}$			
	Low	$V_{RST(MAX)} < V_{CC} < 3.6V$			0.6	
WDI Input Current		WDI = $V_{CC}$		0.1	1	$\mu A$
		WDI = 0V	-1	-0.1		
$\overline{MR}$ Pull-Up Resistor				52		k $\Omega$
$\overline{MR}$ Pulse Width	$t_{MR}$			15		ns
$\overline{MR}$ Input Threshold	High	$V_{CC}=5.0V$	4.0			V
	Low	$V_{CC}=5.0V$			0.6	
	High	$V_{RST(MAX)} < V_{CC} < 3.6V$	$0.8xV_{CC}$			
	Low	$V_{RST(MAX)} < V_{CC} < 3.6V$			$0.15xV_{CC}$	
$\overline{MR}$ to Reset Out Delay	$t_{MD}$			23		ns

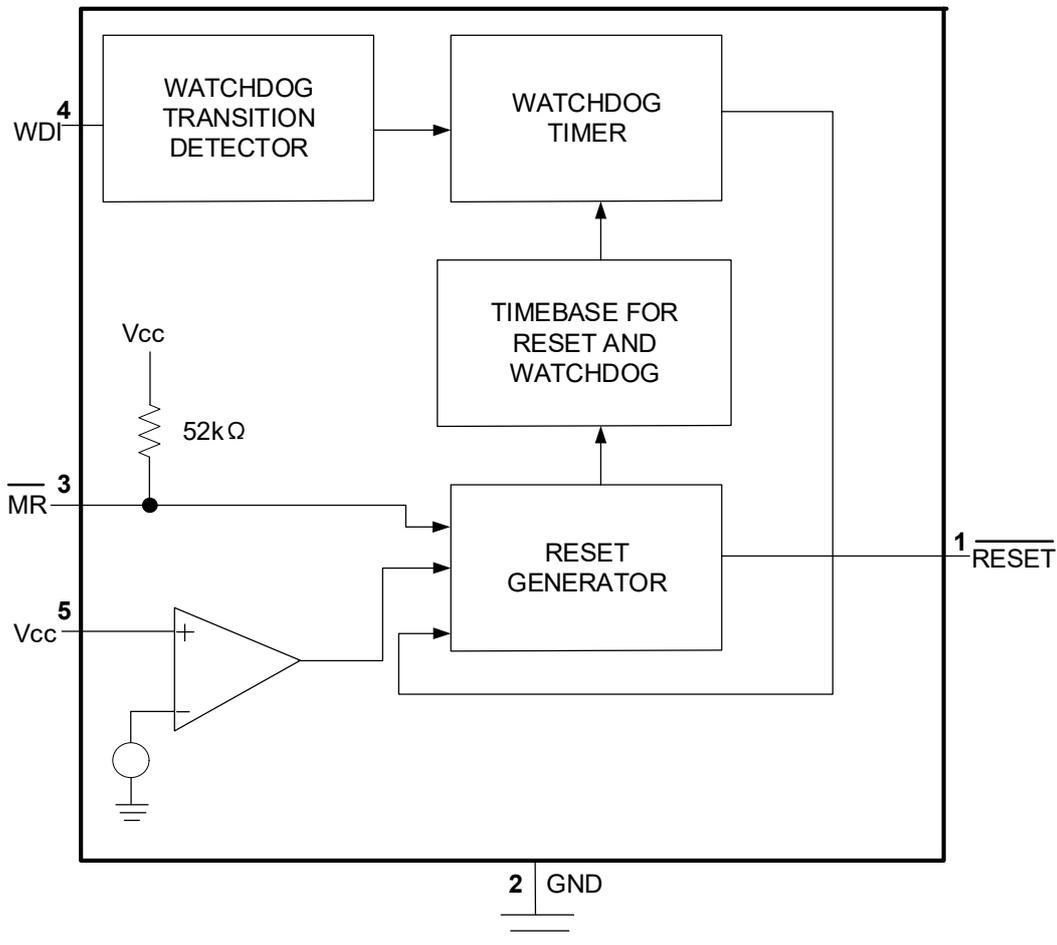
## Typical Operating Characteristics



## Typical Operating Characteristics



## Function Block Diagram



## Detailed Description

### Reset Output

A microprocessor's ( $\mu P$ 's) reset input starts the  $\mu P$  in a known state. Whenever the  $\mu P$  is in an unknown state, it should be held in reset. The RS806 asserts reset during power-up and prevents code execution errors during power-down or brownout conditions.

On power-up, once  $V_{CC}$  reaches 1.0V,  $\overline{RESET}$  is a guaranteed logic low of 0.4V or less. As  $V_{CC}$  rises,  $\overline{RESET}$  stays low. When  $V_{CC}$  rises above the reset threshold, an internal timer releases  $\overline{RESET}$  after about 200ms.  $\overline{RESET}$  pulses low whenever  $V_{CC}$  dips below the reset threshold. If brownout occurs in the middle of a previously initiated reset pulse, the pulse continues for at least another 100ms. On power-down, once  $V_{CC}$  falls below the reset threshold,  $\overline{RESET}$  stays low and is guaranteed to be 0.4V or less until  $V_{CC}$  drops below 1.0V.

### Watchdog Timer

The RS806 watchdog circuit monitors the  $\mu P$ 's activity. If the  $\mu P$  does not toggle the watchdog input (WDI) within 1.6 sec (Minimum is 1.0 sec) and WDI is not three states,  $\overline{RESET}$  goes low. As long as  $\overline{RESET}$  is asserted or the WDI input is three states, the watchdog timer stays cleared and will not count. As soon as reset is released and WDI is driven high or low, the timer starts counting. Pulses as short as 50ns can be detected.

Typically,  $\overline{RESET}$  is not connected to the non-maskable interrupt input (NMI) of a  $\mu P$ . When  $V_{CC}$  drops below the reset threshold,  $\overline{RESET}$  goes 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,  $\overline{\text{RESET}}$  can be used as a low-line output. Since floating WDI disable the internal timer,  $\overline{\text{RESET}}$  goes low only when  $V_{CC}$  falls below the reset threshold, thus functioning as a low-line output.

### Manual Reset

The manual-reset input ( $\overline{MR}$ ) allows reset to be triggered by a push-button switch.  $\overline{MR}$  is TTL/CMOS logic compatible, so it can be driven by an external logic line.  $\overline{MR}$  can be used to force a watchdog timeout to generate a reset pulse in the RS806. Simply connect  $\overline{RESET}$  to  $\overline{MR}$ .

### Applications Information

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

When  $V_{CC}$  falls down below 1V, the RS806  $\overline{RESET}$  output no longer sinks current, it becomes an open circuit. High-impedance CMOS logic inputs can drift to undetermined voltages if left un-driven. If a pull-down resistor is added to the  $\overline{RESET}$  pin, as shown in Figure 1, any stray charge or leakage currents will be drained to ground, holding  $\overline{RESET}$  low. Resistor value (R1) is not critical. It should be about 100K $\Omega$ , large enough not to load  $\overline{RESET}$  and small enough to pull  $\overline{RESET}$  to ground.

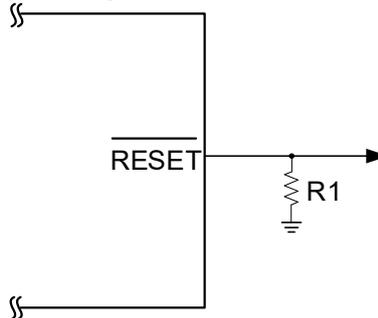


Figure 1.  $\overline{RESET}$  Valid to Ground Circuit

#### Interfacing to $\mu P$ s with Bidirectional Reset Pins

$\mu P$ s with bidirectional reset pins, can contend with the RS806  $\overline{RESET}$  output. If, for example, the  $\overline{RESET}$  output is driven high and the  $\mu P$  wants to pull it low, indeterminate logic levels may result. To correct this, connect a 4.7K $\Omega$  resistor between the  $\overline{RESET}$  output and the  $\mu P$  reset I/O, as in Figure 2. Buffer the  $\overline{RESET}$  output to other system components.

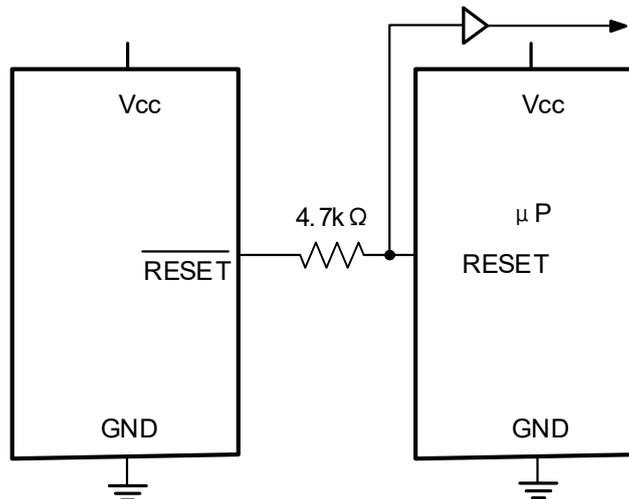
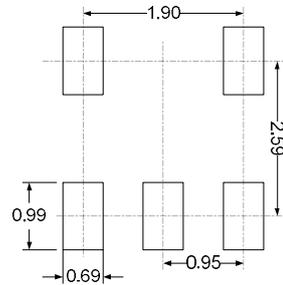
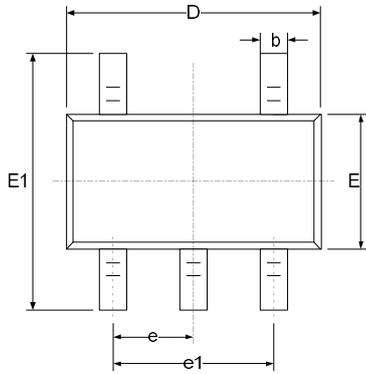


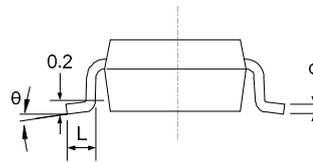
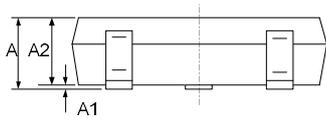
Figure2. Buffered  $\overline{RESET}$  to other system components

# PACKAGE OUTLINE DIMENSIONS

## SOT23-5



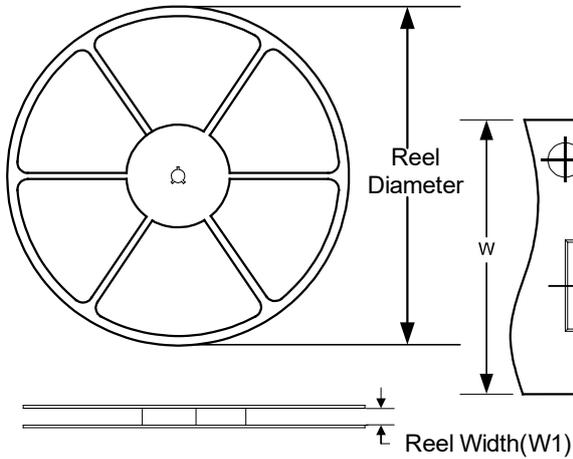
RECOMMENDED LAND PATTERN (Unit: mm)



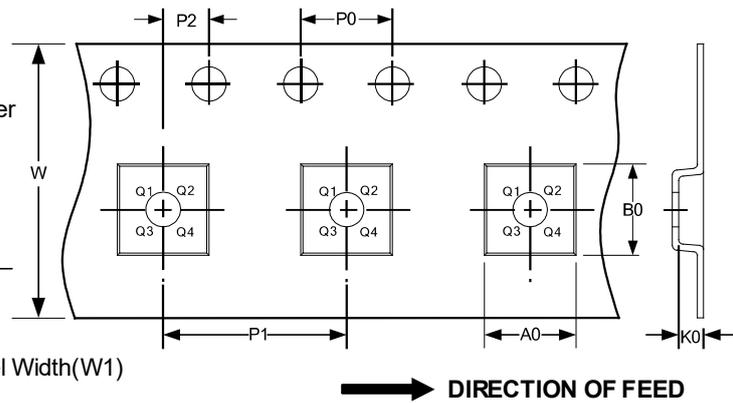
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
$\theta$	0°	8°	0°	8°

## TAPE AND REEL INFORMATION

### REEL DIMENSIONS



### TAPE DIMENSION



NOTE: The picture is only for reference. Please make the object as the standard.

### KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOT23-5	7"	9.5	3.20	3.20	1.40	4.0	4.0	2.0	8.0	Q3