

# Supply Voltage Supervisor with Open-Drain Reset

## 1 FEATURES

- **Operating Voltage Range: 1.2V to 5.5V**
- **Low Power Consumption: 50 $\mu$ A (Max)**
- **Precision Supply-Voltage Monitor: 2.63V, 2.93V, 3.08V, 4.00V, 4.65V**
- **Guaranteed  $\overline{\text{RESET}}$  Valid at  $V_{\text{CC}}=1.2\text{V}$**
- **200ms Reset Pulse Width**
- **Voltage Monitor for Power-Fail or Low-Battery Warning**
- **Operating Temperature Range: -40 $^{\circ}$ C to +125 $^{\circ}$ C**
- **Open-Drain,  $\overline{\text{RESET}}$  Output**
- **Available in Green Package: SOT23**

## 2 APPLICATIONS

- **Computers**
- **SOC, DSP or Micro controllers**
- **Embedded Systems**
- **Industrial Equipment**
- **Intelligent Instruments**
- **Critical  $\mu$ P Power Monitoring**
- **Wireless Communications Systems**

## 3 DESCRIPTIONS

The RS803 microprocessor ( $\mu$ P) supervisory circuits reduce the complexity and number of components required to monitor power-supply and battery function in  $\mu$ P systems. This device significantly improves system reliability and accuracy compared to separate ICs or discrete components.

These circuits perform a single function: they assert a reset signal whenever the  $V_{\text{CC}}$  supply voltage declines below a preset threshold, keeping it asserted for at least 200ms after  $V_{\text{CC}}$  has risen above the reset threshold. Reset thresholds suitable for operation with a variety of supply voltages are available.

The RS803 has an open-drain output stage. The RS803's open-drain  $\overline{\text{RESET}}$  output requires a pull-up resistor that can be connected to a voltage higher than  $V_{\text{CC}}$ . The RS803 have an active-low  $\overline{\text{RESET}}$  output. The reset comparator is designed to ignore fast transients on  $V_{\text{CC}}$ , and the outputs are guaranteed to be in the correct logic state for  $V_{\text{CC}}$  down to 1.2V.

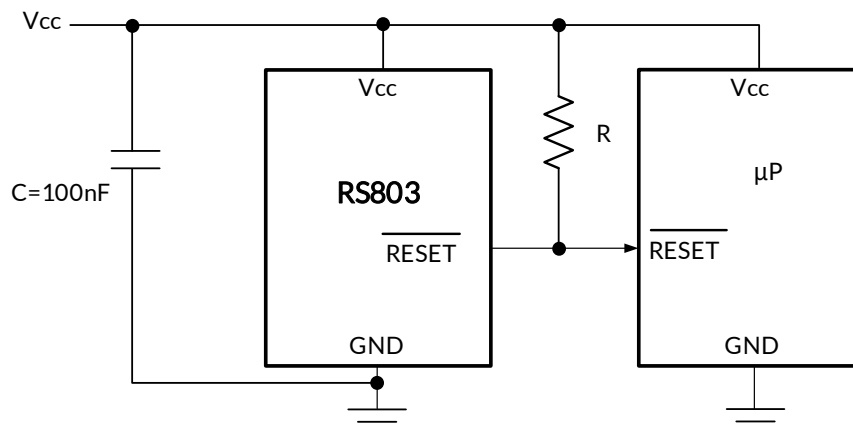
Low supply current makes the RS803 ideal for use in portable equipment. The RS803 is available in Green SOT23 package. It operates over an ambient temperature range of -40 $^{\circ}$ C to +125 $^{\circ}$ C.

### Device Information (1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
RS803	SOT23	1.30mm $\times$ 2.92mm

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

## 4 TYPICAL APPLICATION



## Table of Contents

<b>1 FEATURES</b> .....	1
<b>2 APPLICATIONS</b> .....	1
<b>3 DESCRIPTIONS</b> .....	1
<b>4 TYPICAL APPLICATION</b> .....	1
<b>5 Revision History</b> .....	3
<b>6 PACKAGE/ORDERING INFORMATION</b> <sup>(1)</sup> .....	4
<b>7 PIN CONFIGURATIONS</b> .....	5
<b>8 Specifications</b> .....	6
8.1 Absolute Maximum Ratings <sup>(1)</sup> .....	6
8.2 ESD Ratings .....	6
8.3 ELECTRICAL CHARACTERISTICS .....	7
8.4 TYPICAL OPERATING CHARACTERISTICS .....	8
<b>9 Function Block Diagram</b> .....	9
<b>10 Detailed Description</b> .....	9
<b>11 Applications Information</b> .....	10
11.1 Interfacing to $\mu$ Ps with Bidirectional Reset Pins .....	10
11.2 RS803 Open-Drain $\overline{\text{RESET}}$ Output Allows Use with Multiple Supplies .....	10
<b>12 PACKAGE OUTLINE DIMENSIONS</b> .....	11
<b>13 TAPE AND REEL INFORMATION</b> .....	12

## 5 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
A.2	2023/07/24	<ol style="list-style-type: none"><li>1. Update PACKAGE MARKING on Page 5@RevA.1</li><li>2. Update Operating Temperature Range: -40°C to +125°C</li><li>3. Modify Operating Voltage Range: 1.2V to 5.5V</li><li>4. Update ESD Ratings</li><li>5. Added RS803-4.65YSF3 ORDERING NUMBER</li></ol>
A.3	2024/03/12	<ol style="list-style-type: none"><li>1. Added RS803-4.65YSF3B ORDERING NUMBER</li><li>2. Added MSL on Page 4@RevA.2</li></ol>

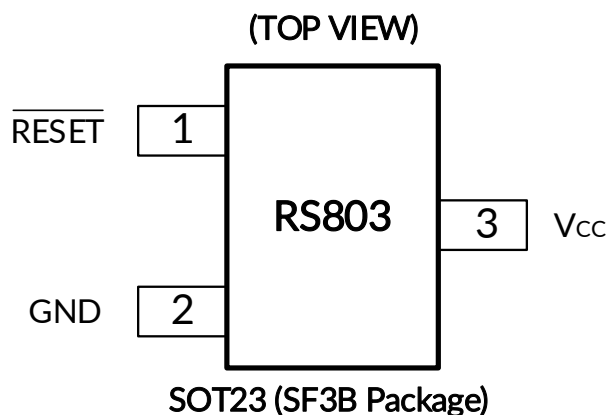
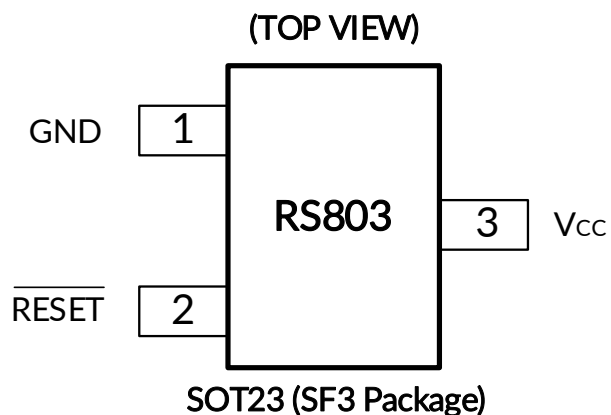
**6 PACKAGE/ORDERING INFORMATION (1)**

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING (2/3)	MSL (4)	PACKAGE OPTION
RS803	RS803-2.63YSF3	-40°C ~+125°C	SOT23	803B	MSL3	Tape and Reel,3000
	RS803-2.93YSF3	-40°C ~+125°C	SOT23	803C	MSL3	Tape and Reel,3000
	RS803-3.08YSF3	-40°C ~+125°C	SOT23	803D	MSL3	Tape and Reel,3000
	RS803-4.00YSF3	-40°C ~+125°C	SOT23	803E	MSL3	Tape and Reel,3000
	RS803-4.65YSF3	-40°C ~+125°C	SOT23	803G	MSL3	Tape and Reel,3000
	RS803-4.65YSF3B	-40°C ~+125°C	SOT23	803GB	MSL3	Tape and Reel,3000

**NOTE:**

- (1) This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the right-hand navigation.
- (2) 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.
- (3) B, C, D, E, G represents different Reset Thresholds.
- (4) MSL, The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications.

## 7 PIN CONFIGURATIONS



## PIN DESCRIPTION

PIN		NAME	FUNCTION
SOT23 (SF3 Package)	SOT23 (SF3B Package)		
1	2	GND	Ground, reference for all signals.
2	1	$\overline{\text{RESET}}$	Active-Low Reset Output remains low while $V_{CC}$ is below the reset threshold, and for at least 200ms after $V_{CC}$ rises above the reset threshold.
3	3	$V_{CC}$	Power Supply Voltage that is monitored.

## 8 Specifications

### 8.1 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
θ <sub>JA</sub>	Package thermal impedance <sup>(4)</sup>	SOT23	295	°C/W
T <sub>J</sub>	Junction temperature <sup>(5)</sup>	-65	150	°C
T <sub>stg</sub>	Storage temperature	-65	150	°C
T <sub>A</sub>	Operating temperature	-40	125	°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.

(4) The package thermal impedance is calculated in accordance with JESD-51.

(5) The maximum power dissipation is a function of T<sub>J(MAX)</sub>, R<sub>θJA</sub>, and T<sub>A</sub>. The maximum allowable power dissipation at any ambient temperature is P<sub>D</sub> = (T<sub>J(MAX)</sub> - T<sub>A</sub>) / R<sub>θJA</sub>. All numbers apply for packages soldered directly onto a PCB.

### 8.2 ESD Ratings

The following ESD information is provided for handling of ESD-sensitive devices in an ESD protected area only.

		VALUE	UNIT	
V <sub>(ESD)</sub>	Electrostatic discharge	Human-body model (HBM), MIL-STD-883K METHOD 3015.9	±4000	V
		Machine model (MM), JESD22-A115C (2010)	±200	V



#### ESD SENSITIVITY CAUTION

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

### 8.3 ELECTRICAL CHARACTERISTICS

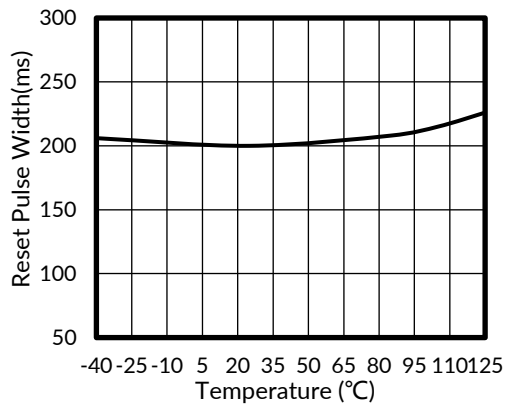
( $V_{CC} = 2.74V$  to  $5.5V$  for RS803-2.63;  $V_{CC} = 3.05V$  to  $5.5V$  for RS803-2.93;  $V_{CC} = 3.21V$  to  $5.5V$  for RS803-3.08;  $V_{CC} = 4.17V$  to  $5.5V$  for RS803-4.00;  $V_{CC} = 4.84V$  to  $5.5V$  for RS803-4.65;  $T_A = -40^{\circ}C$  to  $+125^{\circ}C$ , unless otherwise noted, typical at  $25^{\circ}C$ .)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Operating Voltage Range	$V_{CC}$		1.2		5.5	V
Supply Current	$I_{SUPPLY}$			20	50	$\mu A$
Reset Threshold	$V_{RT}$	RS803-2.63	2.50	2.63	2.74	V
		RS803-2.93	2.80	2.93	3.05	
		RS803-3.08	2.94	3.08	3.21	
		RS803-4.00	3.82	4.00	4.17	
		RS803-4.65	4.44	4.65	4.84	
Reset Threshold Hysteresis		RS803-2.63		12		mV
		RS803-2.93		14		
		RS803-3.08		15		
		RS803-4.00		20		
		RS803-4.65		23		
Reset Pulse Width	$t_{RS}$		100	200	460	ms
Reset Threshold Temperature Coefficient <sup>(1)</sup>				30		ppm/ $^{\circ}C$
$V_{CC}$ to $\overline{RESET}$ delay	$t_{RD}$	$V_{CC}=3.3V$ , RS803-2.93		33		$\mu s$
$\overline{RESET}$ Output voltage	Low	$I_{OL} = 1.2mA$			0.4	V
$\overline{RESET}$ Open-Drain output Leakage Current	$I_{lk(OD)}$	$V_{CC} > V_{RT}$ , RESET deasserted			1	$\mu A$

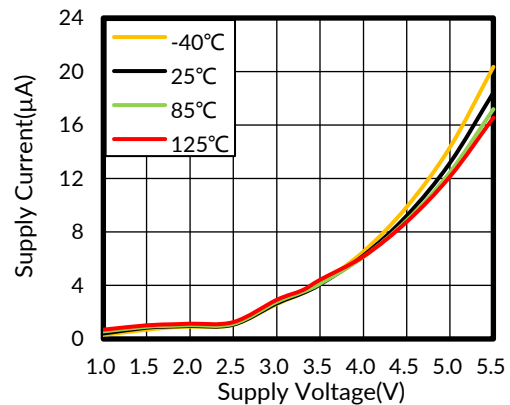
(1) This parameter is ensured by design and/or characterization and is not tested in production.

## 8.4 TYPICAL OPERATING CHARACTERISTICS

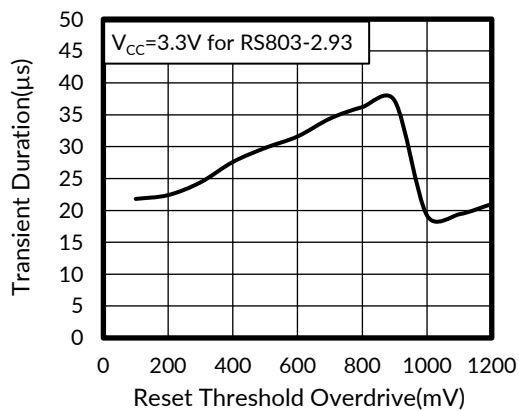
NOTE: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only.



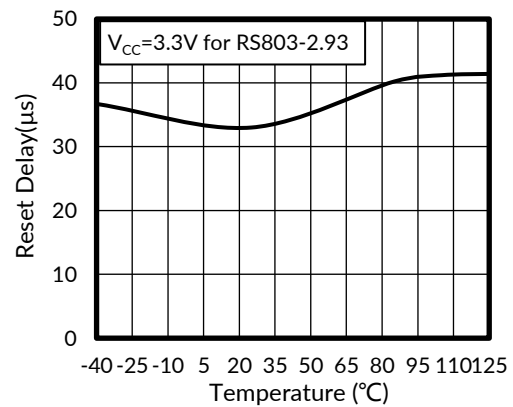
**Figure 1. Reset Pulse Width vs Temperature**



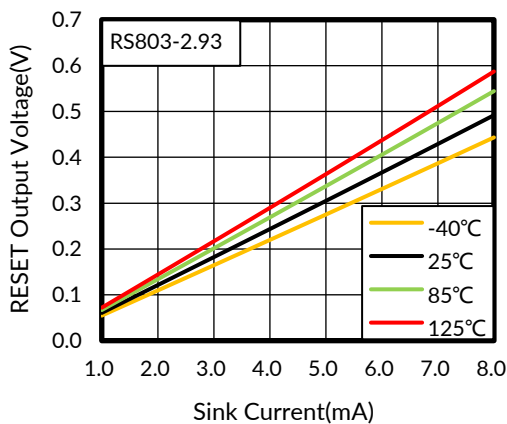
**Figure 2. Supply Voltage vs Supply Current**



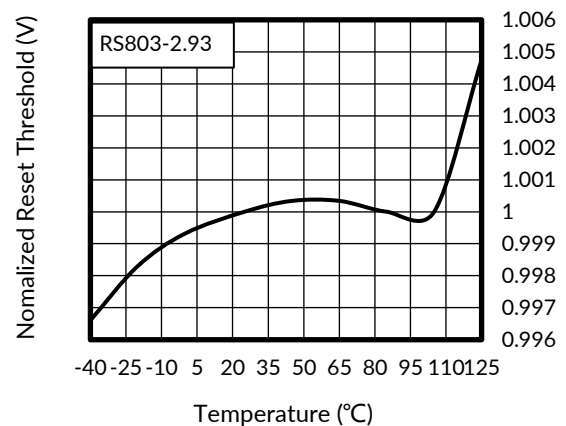
**Figure 3. Transient Duration vs Reset Threshold Overdrive**



**Figure 4. Reset Delay vs Temperature**



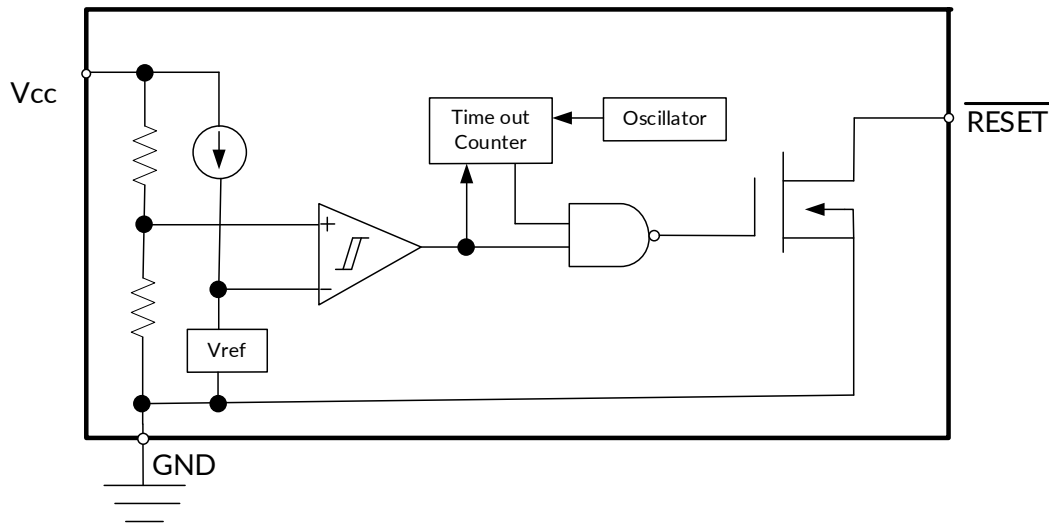
**Figure 5. RESET Output Voltage vs Sink Current**



**Figure 6. Normalized Reset Threshold vs Temperature**



## 9 Function Block Diagram



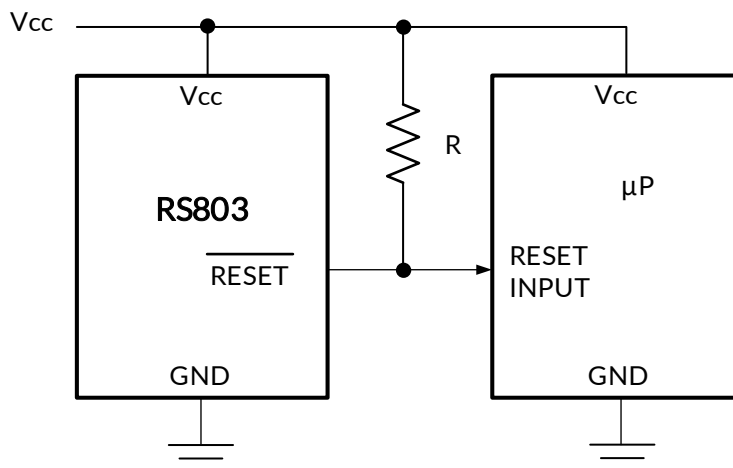
## 10 Detailed Description

A microprocessor's ( $\mu\text{P}$ 's) reset input starts the  $\mu\text{P}$  in a known state. The RS803 asserts reset to prevent code-execution errors during power-up, power-down or brownout conditions. They assert a reset signal whenever the  $V_{\text{CC}}$  supply voltage declines below a preset threshold, keeping it asserted for at least 200ms after  $V_{\text{CC}}$  has risen above the reset threshold. The RS803 uses an open-drain output. Connect a pull-up resistor on the RS803's  $\overline{\text{RESET}}$  output pin to any supply voltage between 0V to 6V.

## 11 Applications Information

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

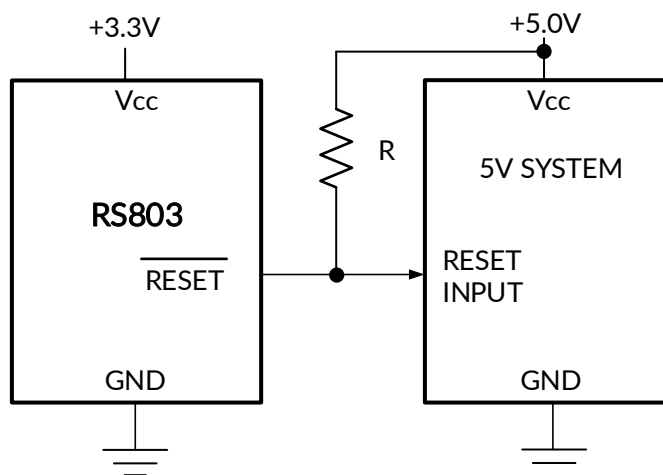
Since the  $\overline{\text{RESET}}$  output on the RS803 is open drain, this device interfaces easily with  $\mu$ P's with bidirectional reset pins. Connecting the  $\mu$ P supervisor's  $\overline{\text{RESET}}$  output directly to the  $\mu$ P's  $\overline{\text{RESET}}$  pin with a single pull-up resistor allows either device to assert reset (Figure 7).



**Figure 7. Interfacing to  $\mu$ P's with Bidirectional Reset I/O**

### 11.2 RS803 Open-Drain $\overline{\text{RESET}}$ Output Allows Use with Multiple Supplies

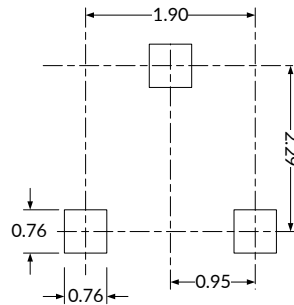
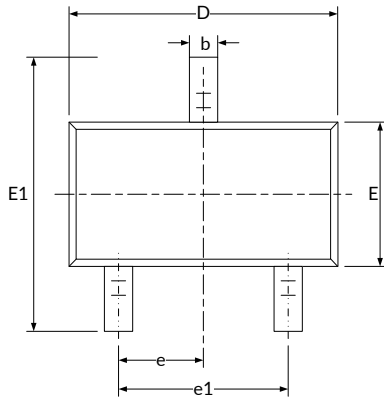
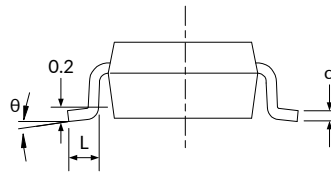
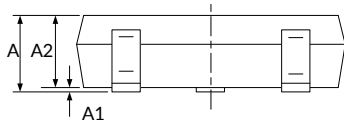
The pull-up connected to the RS803 will connect to the supply voltage that is being monitored at the  $\mu$ P's  $V_{CC}$  pin. However, some systems may use the open-drain output to level-shift from the monitored supply to reset circuitry powered by some other supply (Figure 8). Note that as the RS803's  $V_{CC}$  decreases below 1.2V, so does the  $\mu$ P'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 0V. The voltage where this occurs depends on the pull-up resistor value and the voltage to which it is connected.



**Figure 8. RS803 Open-Drain  $\overline{\text{RESET}}$  output Allows Use with Multiple Supplies**

# 12 PACKAGE OUTLINE DIMENSIONS

## SOT23 <sup>(3)</sup>

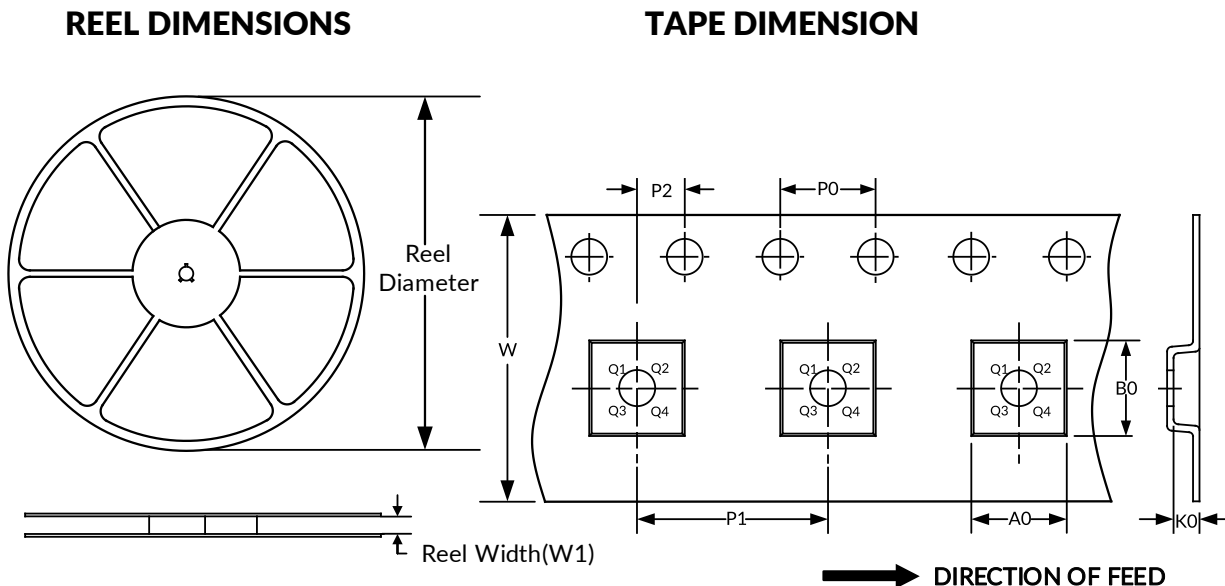

**RECOMMENDED LAND PATTERN (Unit: mm)**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A <sup>(1)</sup>	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D <sup>(1)</sup>	2.800	3.000	0.110	0.118
E <sup>(1)</sup>	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 (BSC) <sup>(2)</sup>		0.037 (BSC) <sup>(2)</sup>	
e1	1.800	2.000	0.071	0.079
L	0.300	0.500	0.012	0.020
$\theta$	0°	8°	0°	8°

**NOTE:**

1. Plastic or metal protrusions of 0.15mm maximum per side are not included.
2. BSC (Basic Spacing between Centers), "Basic" spacing is nominal.
3. This drawing is subject to change without notice.

### 13 TAPE AND REEL INFORMATION



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	7"	9.5	3.15	2.77	1.22	4.0	4.0	2.0	8.0	Q3

NOTE:

1. All dimensions are nominal.
2. Plastic or metal protrusions of 0.15mm maximum per side are not included.

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