Supply Voltage Supervisor with Manual Reset Input

1 FEATURES

- **Operating Voltage Range: 1.2V to 5.5V**
- **Low Power Consumption: 50µA (Max)**
- **Precision Supply-Voltage Monitor: 2.63V, 2.93V, 3.08V, 4.00V, 4.65V**
- **Guaranteed $\overline{\text{RESET}}$ Valid at V_{CC}=1.2V**
- **200ms Reset Pulse Width**
- **Voltage Monitor for Power-Fail or Low-Battery Warning**
- **Operating Temperature Range: -40°C to +125°C**
- **Available in Green Package: SOT-143**

2 APPLICATIONS

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

3 DESCRIPTIONS

The RS811 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 RS811 provide two functions:
1) A reset output during power-up, power-down, and brownout conditions. The reset output remains operational with V_{CC} as low as 1.2V.
2) An active-low manual-reset input.

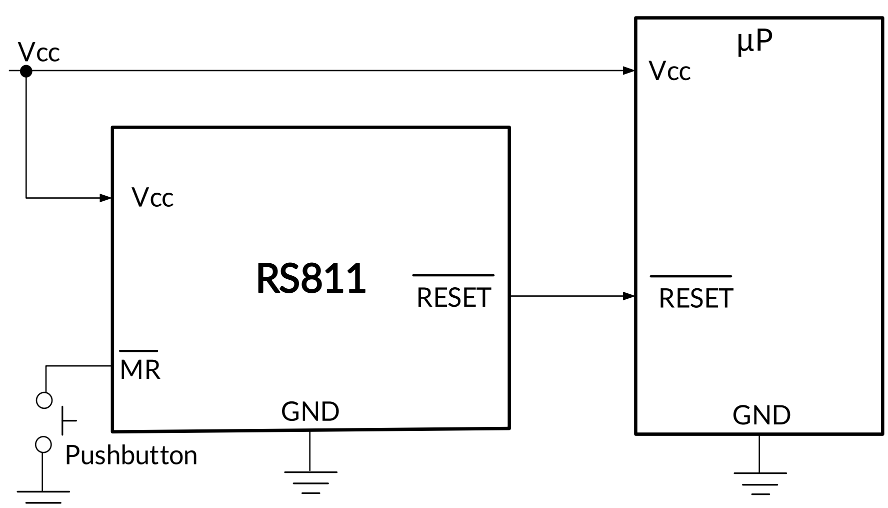
The RS811 is available in Green SOT-143 package. It operates over an ambient temperature range of -40°C to +125°C.

Device Information (1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
RS811	SOT-143	2.90mm x 1.30mm

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

4 TYPICAL APPLICATION



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5 REVISION HISTORY

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

Version	Change Date	Change Item
A.1	2023/04/23	Initial version completed
A.2	2023/07/24	1. Modify Operating Voltage Range: 1.2V to 5.5V 2. Update ESD Ratings 3. Update Reset Pulse Width typical value 4. Added RS811-4.65YA4 ORDERING NUMBER
A.3	2024/04/09	Add MSL on Page 4@RevA.2

6 PACKAGE/ORDERING INFORMATION [1]

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING [2/3]	MSL [4]	PACKAGE OPTION
RS811	RS811-2.63YA4	-40°C ~+125°C	SOT-143	811B	MSL3	Tape and Reel, 3000
	RS811-2.93YA4	-40°C ~+125°C	SOT-143	811C	MSL3	Tape and Reel, 3000
	RS811-3.08YA4	-40°C ~+125°C	SOT-143	811D	MSL3	Tape and Reel, 3000
	RS811-4.00YA4	-40°C ~+125°C	SOT-143	811E	MSL3	Tape and Reel, 3000
	RS811-4.65YA4	-40°C ~+125°C	SOT-143	811G	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.

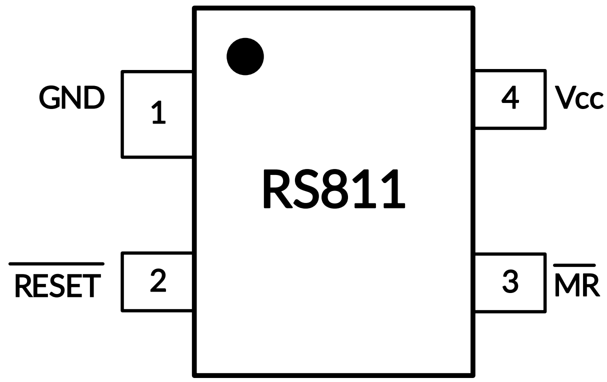
(2) There may be additional marking, which relates to the lot trace code information (data code and vendor code), the logo or the environmental category on the device.

(3) B, C, D, E, G represents different Reset Thresholds.

(4) RUNIC classify the MSL level with using the common preconditioning setting in our assembly factory conforming to the JEDEC industrial standard J-STD-20F, Please align with RUNIC if your end application is quite critical to the preconditioning setting or if you have special requirement.

7 PIN CONFIGURATIONS

(TOP VIEW)



SOT-143

PIN DESCRIPTION

PIN	NAME	FUNCTION
SOT-143		
1	GND	Ground, reference for all signals.
2	$\overline{RESET}$	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 $\overline{MR}$ goes from low to high.
3	$\overline{MR}$	Manual-Reset Input triggers a reset pulse when pulled below 0.1*V_{CC}. This active-low input has an internal pull-up resistance. It can shorted to ground with a switch.
4	V_{CC}	Power Supply Voltage that is monitored.

8 SPECIFICATIONS

8.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted) (1)(2)

			MIN	MAX	UNIT
V_{CC}	Supply voltage range		-0.5	6.0	V
V_I	Input voltage range (2)		-0.5	6.0	V
V_O	Voltage range applied to any output in the high-impedance or power-off state (2)		-0.5	6.0	V
V_O	Voltage range applied to any output in the high or low state (2)(3)		-0.5	V_{CC}+0.5	V
I_{IK}	Input clamp current	V_I<0		-20	mA
I_{OK}	Output clamp current	V_O<0		-20	mA
I_O	Continuous output current			±20	mA
	Continuous current through V_{CC} or GND			±20	mA
$θ_{JA}$	Package thermal impedance (4)	SOT-143		195	°C/W
T_J	Junction temperature (5)		-65	150	°C
T_{stg}	Storage temperature		-65	150	°C
T_A	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_{CC} 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 $T_{J(MAX)}$, $R_{θJA}$, and T_A. The maximum allowable power dissipation at any ambient temperature is $P_D = (T_{J(MAX)} - T_A) / R_{θJA}$. 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
$V_{(ESD)}$	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 RS811-2.63; V_{CC} = 3.05V to 5.5V for RS811-2.93; V_{CC} = 3.21V to 5.5V for RS811-3.08; V_{CC} = 4.17V to 5.5V for RS811-4.00; V_{CC} = 4.84V to 5.5V for RS811-4.65; T_A = -40°C to +125°C, unless otherwise noted, typical at 25°C.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN (2)	TYP (3)	MAX (2)	UNIT
Operating Voltage Range	V_{CC}		1.2		5.5	V
Supply Current	I_{SUPPLY}			20	50	µA
Reset Threshold	V_{RT}	RS811-2.63	2.50	2.63	2.74	V
		RS811-2.93	2.80	2.93	3.05	
		RS811-3.08	2.94	3.08	3.21	
		RS811-4.00	3.82	4.00	4.17	
		RS811-4.65	4.44	4.65	4.84	
Reset Threshold Hysteresis		RS811-2.63		12		mV
		RS811-2.93		14		
		RS811-3.08		15		
		RS811-4.00		20		
		RS811-4.65		23		
Reset Pulse Width	t_{RS}		100	200	460	ms
Reset Threshold Temperature Coefficient (1)				30		ppm/°C
V_{CC} to $\overline{RESET}$ Delay	t_{RD}	V_{CC}=3.3 V, RS811-2.93		33		µs
$\overline{RESET}$ Output Voltage	High	I_{SOURCE} = 500 µA	0.7xV_{CC}			V
	Low	I_{SINK} = 1.2 mA			0.4	
$\overline{MR}$ Pull-Up Resistor			20	52	130	kΩ
$\overline{MR}$ Pulse Width	t_{MR}		150			ns
$\overline{MR}$ Input Threshold	High	V_{CC}=5.0 V	4.0			V
	Low	V_{CC}=5.0 V			0.5	
	High	$V_{RST(MAX)} < V_{CC} < 3.6$ V	0.8xV_{CC}			
	Low	$V_{RST(MAX)} < V_{CC} < 3.6$ V			0.1xV_{CC}	
$\overline{MR}$ to Reset Out Delay	t_{MD}			23	200	ns

(1) This parameter is ensured by design and/or characterization and is not tested in production.
(2) Limits are 100% production tested at 25°C. Limits over the operating temperature range are ensured through correlations using statistical quality control (SQC) method.
(3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration.

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.

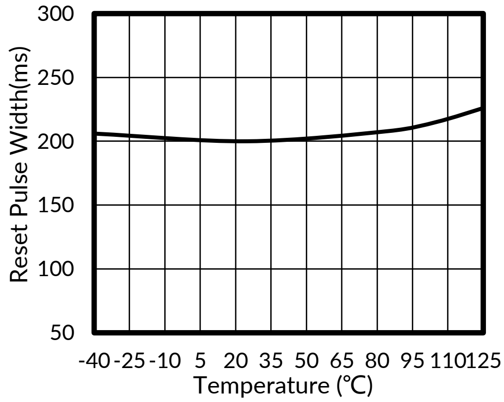


Figure 1. Reset Pulse Width vs Temperature

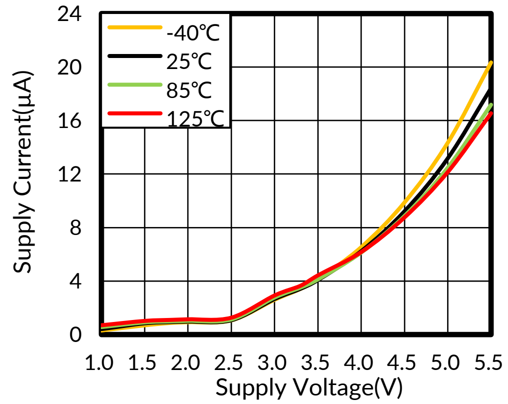


Figure 2. Supply Voltage vs Supply Current

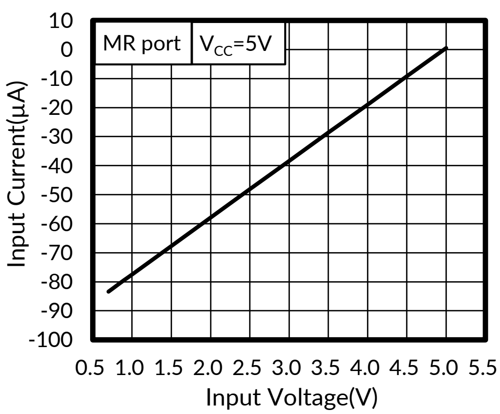


Figure 3. Input Voltage vs Input Current

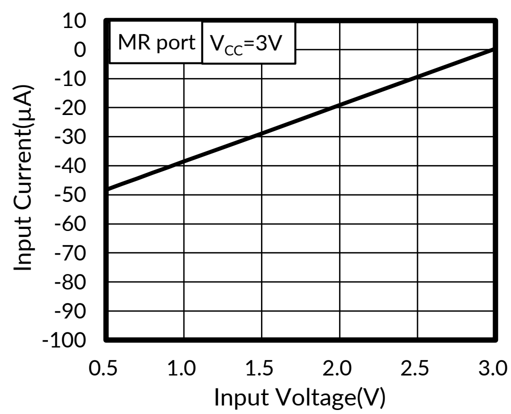


Figure 4. Input Voltage vs Input Current

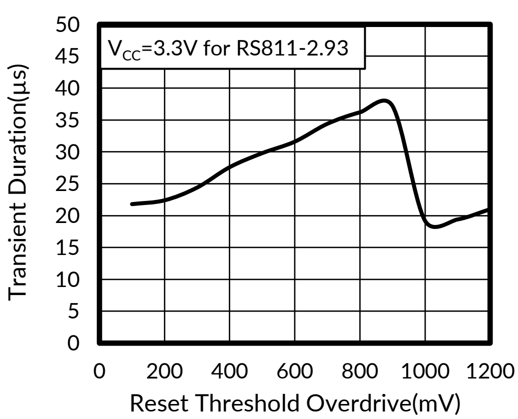


Figure 5. Transient Duration vs Reset Threshold Overdrive

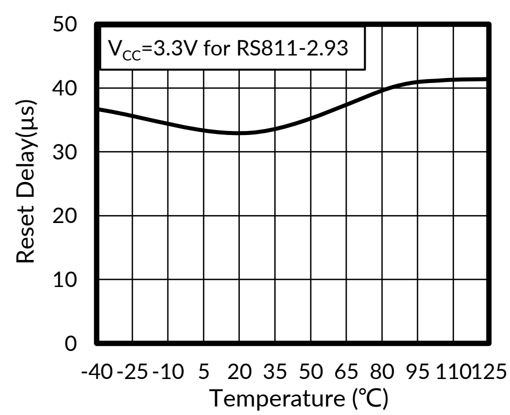


Figure 6. Reset Delay vs Temperature

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.

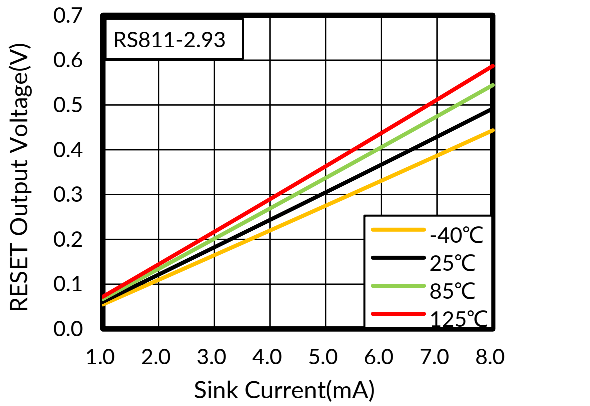


Figure 7. RESET Output Voltage vs Sink Current

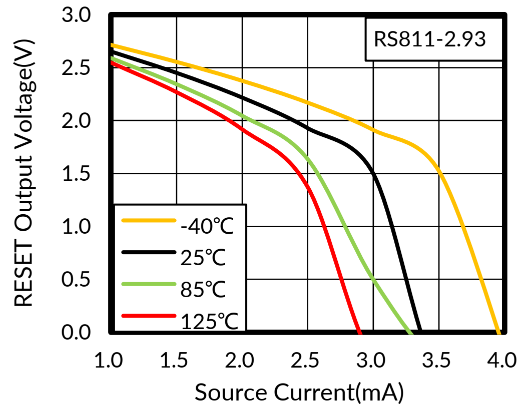


Figure 8. RESET Output Voltage vs Source Current

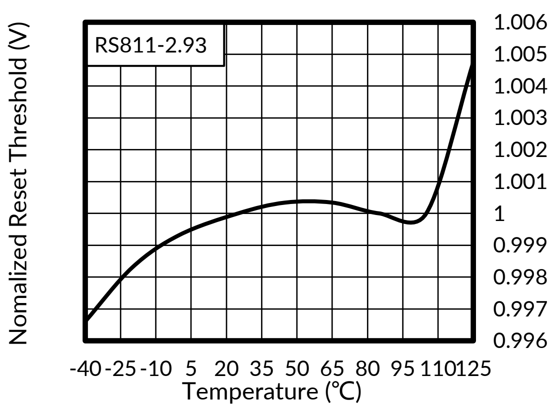


Figure 9. Normalized Reset Threshold vs Temperature

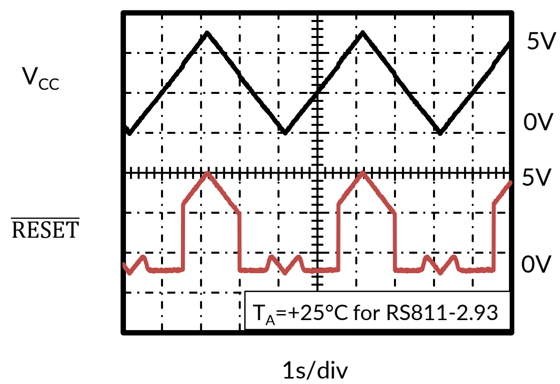


Figure 10. RESET Output Voltage vs Supply Voltage

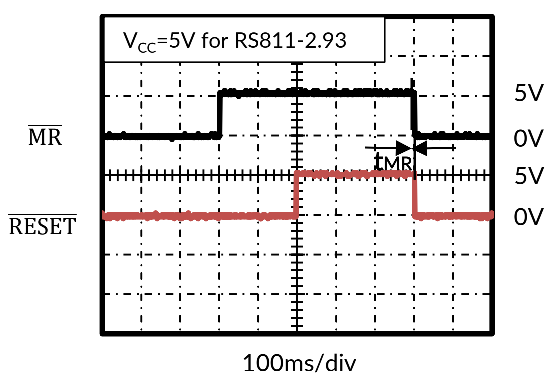


Figure 11. RESET Timing

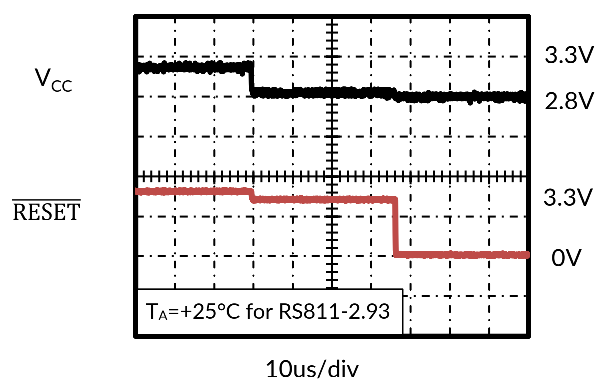
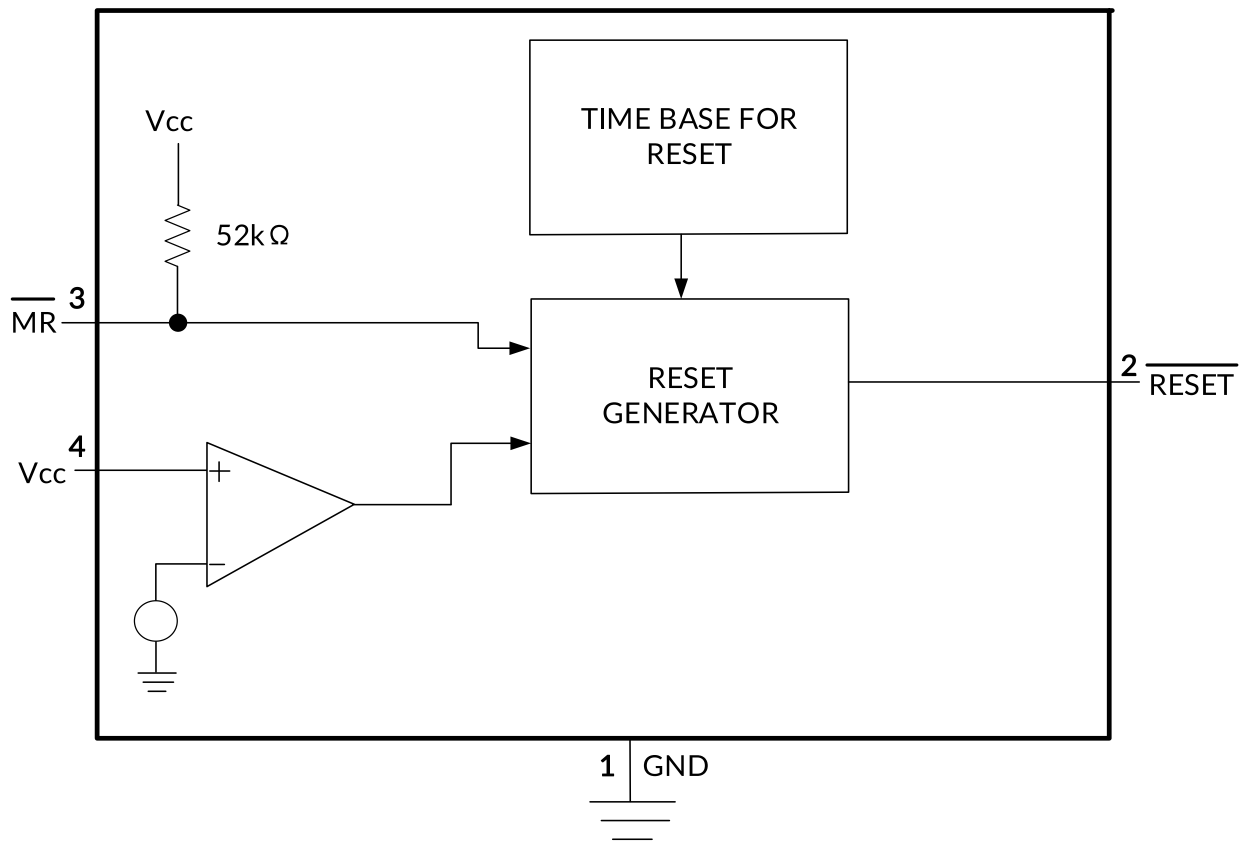


Figure 12. RESET Response Time

9 FUNCTION BLOCK DIAGRAM



10 DETAILED DESCRIPTION

10.1 Reset Output

A microprocessor's (µP's) reset input starts the µP in a known state. Whenever the µP is in an unknown state, it should be held in reset. The RS811 assert reset during power-up and prevent code execution errors during power-down or brownout conditions.

On power-up, once V_{CC} reaches 1.2V, $\overline{RESET}$ 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 release $\overline{RESET}$ 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 1.2V.

10.2 Manual Reset

The manual-reset input ($\overline{MR}$) allows reset to be triggered by a push-button switch. 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 RS811. Simply connect $\overline{RESET}$ to $\overline{MR}$.

11 APPLICATIONS INFORMATION

11.1 Ensuring a Valid RESET Output Down to V_{CC}=0V

When V_{CC} falls down below 1.2V, the RS811 $\overline{\text{RESET}}$ 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 $\overline{\text{RESET}}$ pin, as shown in Figure 13, any stray charge or leakage currents will be drained to ground, holding $\overline{\text{RESET}}$ low. Resistor value (R1) is not critical. It should be about 100KΩ，large enough not to load $\overline{\text{RESET}}$ and small enough to pull $\overline{\text{RESET}}$ to ground.

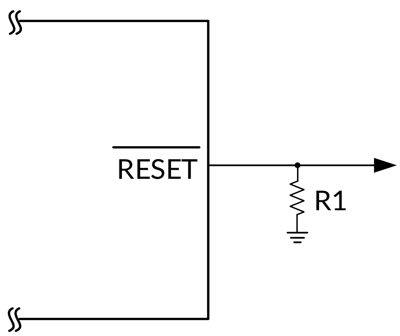


Figure 13. RESET Valid to Ground Circuit

11.2 Interfacing to µPs with Bidirectional Reset Pins

µPs with bidirectional reset pins, can contend with the RS811 $\overline{\text{RESET}}$ output. If, for example, the $\overline{\text{RESET}}$ output is driven high and the µP wants to pull it low, indeterminate logic levels may result. To correct this, connect a 4.7KΩ resistor between the $\overline{\text{RESET}}$ output and the µP reset I/O, as in Figure 14. Buffer the $\overline{\text{RESET}}$ output to other system components.

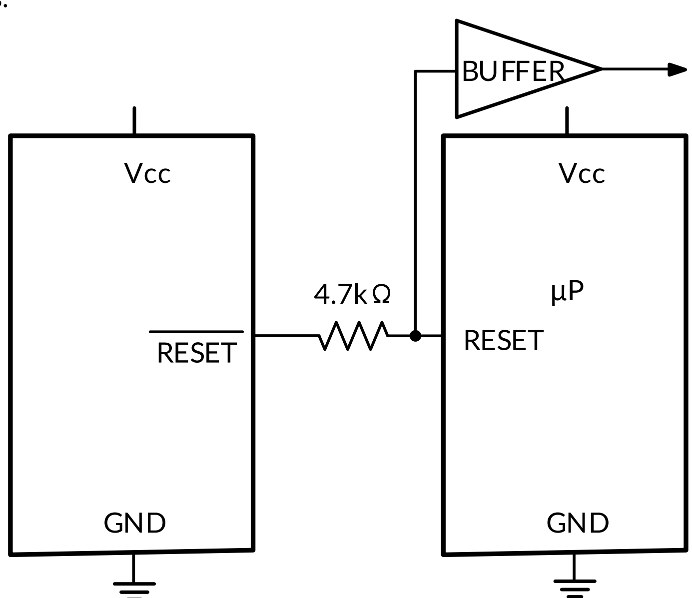
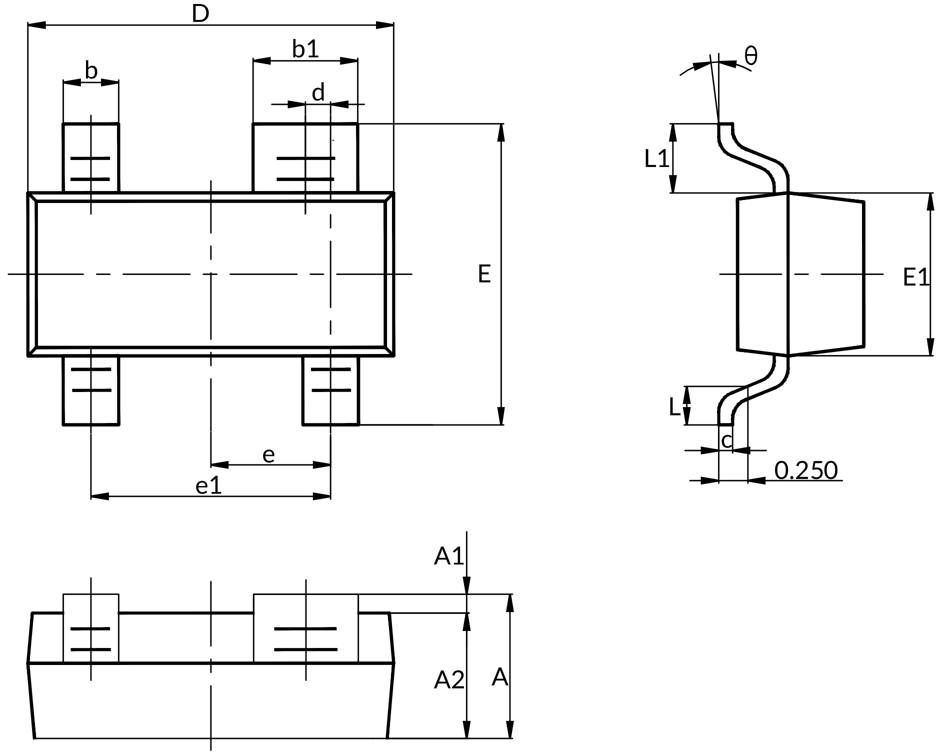


Figure 14. Buffered $\overline{\text{RESET}}$ to other system components

12 PACKAGE OUTLINE DIMENSIONS

SOT-143 (3)



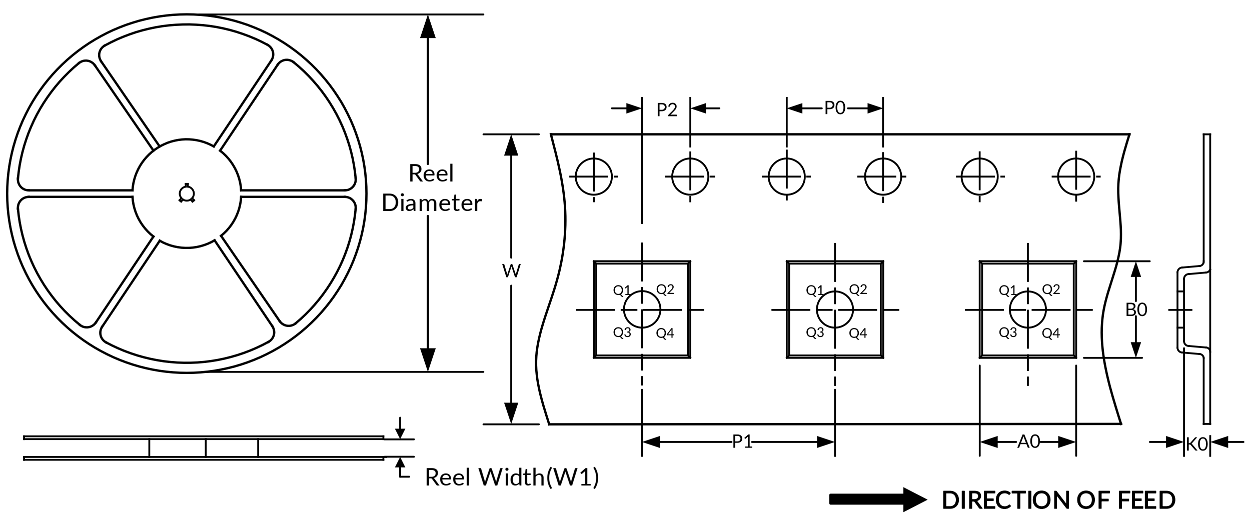
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A (1)	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
b1	0.750	0.900	0.030	0.035
c	0.080	0.150	0.003	0.006
D (1)	2.800	3.000	0.110	0.118
d	0.200 (TYP)		0.008 (TYP)	
E	2.250	2.550	0.089	0.100
E1 (1)	1.200	1.400	0.047	0.055
e	0.950 (TYP)		0.037 (TYP)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.500	0.012	0.020
L1	0.550 (REF) (2)		0.022 (REF) (2)	
θ	0°	8°	0°	8°

NOTE:

1. Plastic or metal protrusions of 0.15mm maximum per side are not included.
2. REF is the abbreviation for Reference.
3. This drawing is subject to change without notice.

13 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
SOT-143	7"	8.30	3.19	2.80	1.31	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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