Supply Voltage Supervisor with Reset Circuits

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**
- **Push-pull, $\overline{\text{RESET}}$ Output**
- **Available in Green Package: SOT23**

2 APPLICATIONS

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

3 DESCRIPTIONS

The RS809 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.

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

The RS809 have push-pull outputs. The RS809 have 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 1.2V.

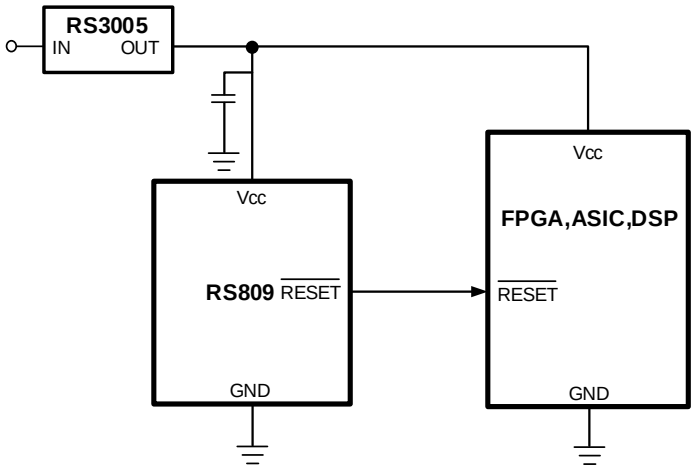
Low supply current makes the RS809 ideal for use in portable equipment. The RS809 is available in Green SOT23 package. It operates over an ambient temperature range of -40°C to +125°C.

Device Information (1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
RS809	SOT23(3)	1.30mm×2.92mm

(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	2021/08/09	Initial version completed
A.2	2022/05/09	1. Update PACKAGE MARKING on Page 5@RevA.1 2. Update Operating Temperature Range :-40°C to +125°C
A.3	2022/05/10	Update TYPICAL OPERATING CHARACTERISTICS
A.4	2022/11/25	1. Update TYPICAL OPERATING CHARACTERISTICS 2. Update PACKAGE/ORDERING INFORMATION
A.5	2023/07/24	1. Modify Operating Voltage Range: 1.2V to 5.5V 2. Update ESD Ratings

6 PACKAGE/ORDERING INFORMATION (1)

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING (2/3)	PACKAGE OPTION
RS809	RS809-2.63YSF3	-40°C ~+125°C	SOT23	809B	Tape and Reel,3000
	RS809-2.93YSF3	-40°C ~+125°C	SOT23	809C	Tape and Reel,3000
	RS809-3.08YSF3	-40°C ~+125°C	SOT23	809D	Tape and Reel,3000
	RS809-4.00YSF3	-40°C ~+125°C	SOT23	809E	Tape and Reel,3000
	RS809-4.65YSF3	-40°C ~+125°C	SOT23	809G	Tape and Reel,3000

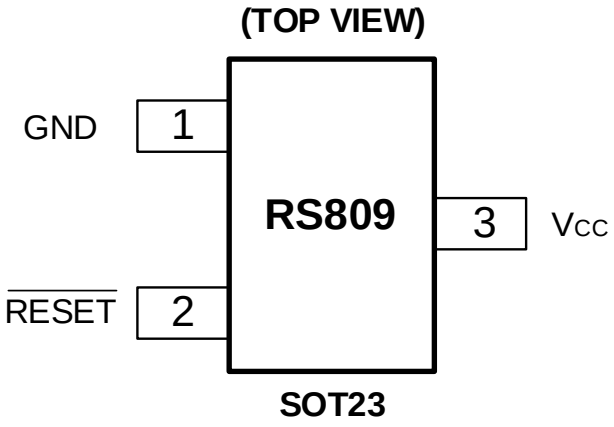
NOTE:

(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.

7 PIN CONFIGURATIONS



PIN DESCRIPTION

PIN SOT23	NAME	FUNCTION
1	GND	Ground, reference for all signals.
2	$\overline{\text{RESET}}$	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	V_{CC}	Power Supply Voltage that is monitored.

8 SPECIFICATIONS

8.1 Absolute Maximum Ratings (1)

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
Vo	Voltage range applied to any output in the high-impedance or power-off state (2)		-0.5	6.0	V
Vo	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)	SOT23		295	°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 $T_{J(MAX)}$, $R_{\theta JA}$, and T_A. The maximum allowable power dissipation at any ambient temperature is $P_D = (T_{J(MAX)} - T_A) / R_{\theta JA}$. 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 RS809-2.63; V_{CC} = 3.05V to 5.5V for RS809-2.93; V_{CC} = 3.21V to 5.5V for RS809-3.08; V_{CC} = 4.17V to 5.5V for RS809-4.00; V_{CC} = 4.84V to 5.5V for RS809-4.65; T_A = -40°C to +125°C, unless otherwise noted, typical at 25°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	μA
Reset Threshold	V_{RT}	RS809-2.63	2.50	2.63	2.74	V
		RS809-2.93	2.80	2.93	3.05	
		RS809-3.08	2.94	3.08	3.21	
		RS809-4.00	3.82	4.00	4.17	
		RS809-4.65	4.44	4.65	4.84	
Reset Threshold Hysteresis		RS809-2.63		12		mV
		RS809-2.93		14		
		RS809-3.08		15		
		RS809-4.00		20		
		RS809-4.65		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}=3.3V, RS809-2.93		33		μs
$\overline{RESET}$ Output voltage	High	I_{SOURCE} = 500uA	0.7xV_{CC}			V
	Low	I_{SINK} = 1.2mA			0.4	

(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.

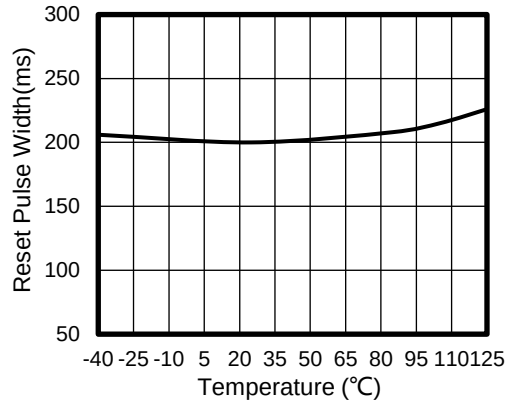


Figure 1. Reset Pulse Width vs Temperature

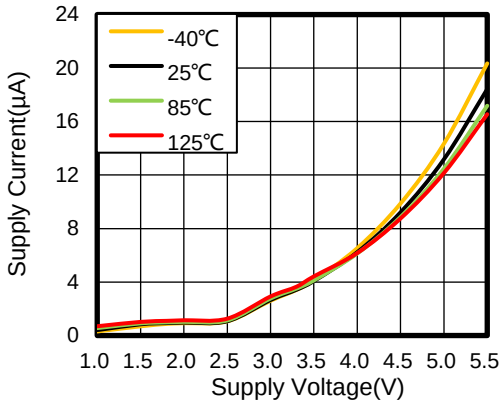


Figure 2. Supply Voltage vs Supply Current

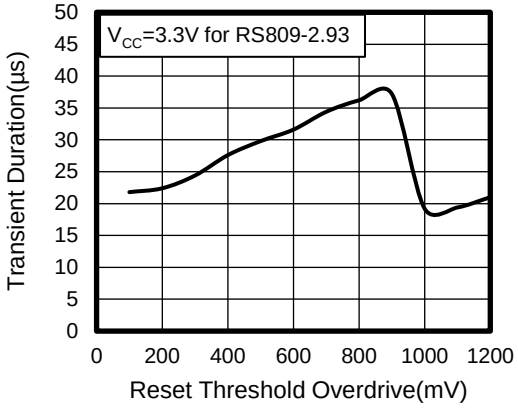


Figure 3. Transient Duration vs Reset Threshold Overdrive

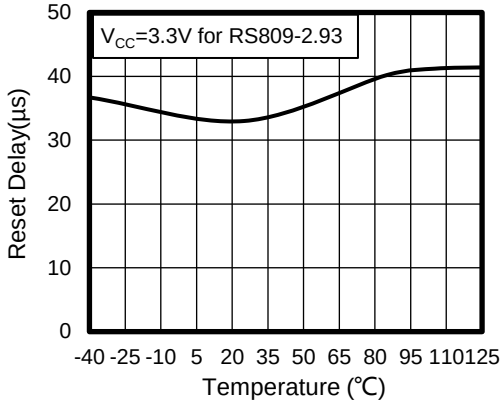


Figure 4. Reset Delay vs Temperature

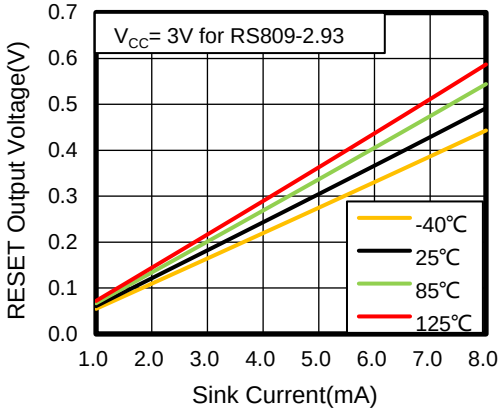


Figure 5. RESET Output Voltage vs Sink Current

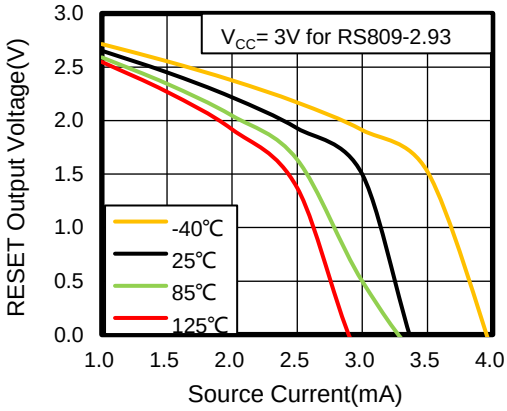


Figure 6. RESET Output Voltage vs Source Current

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.

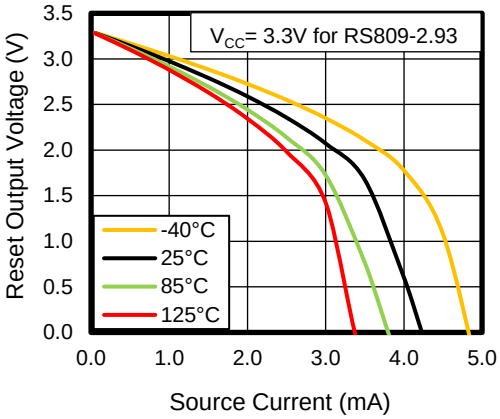


Figure 7. Reset Output Voltage vs Source Current

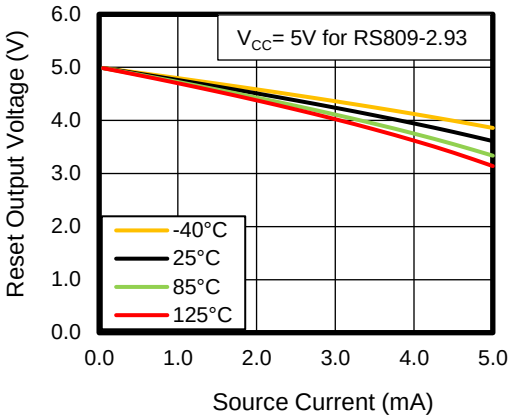


Figure 8. Reset Output Voltage vs Source Current

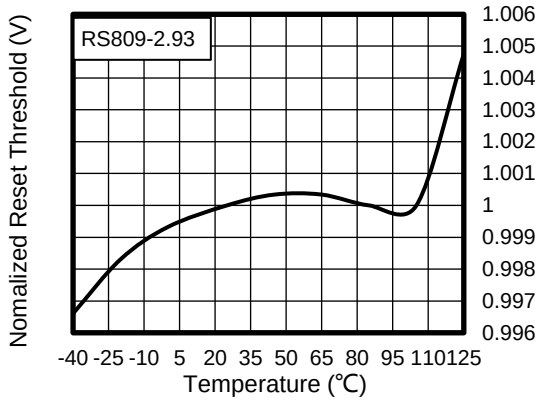


Figure 9. Normalized Reset Threshold vs Temperature

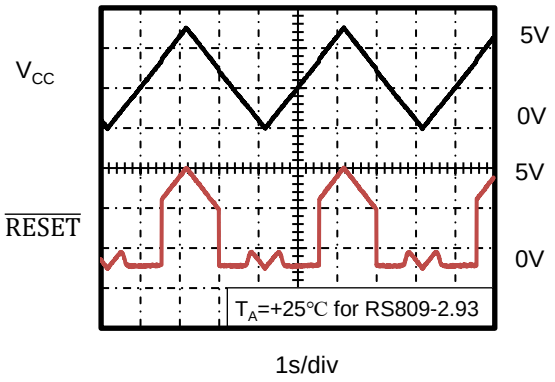


Figure 10. RESET Output Voltage vs Supply Voltage

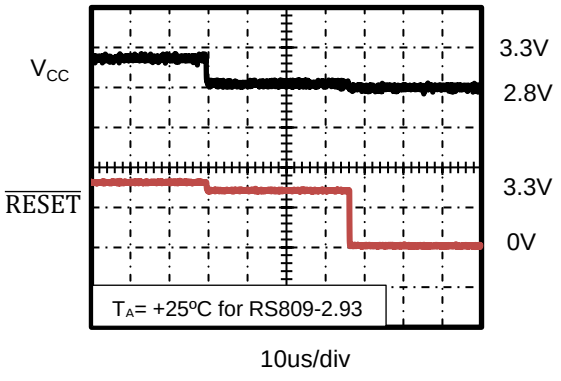
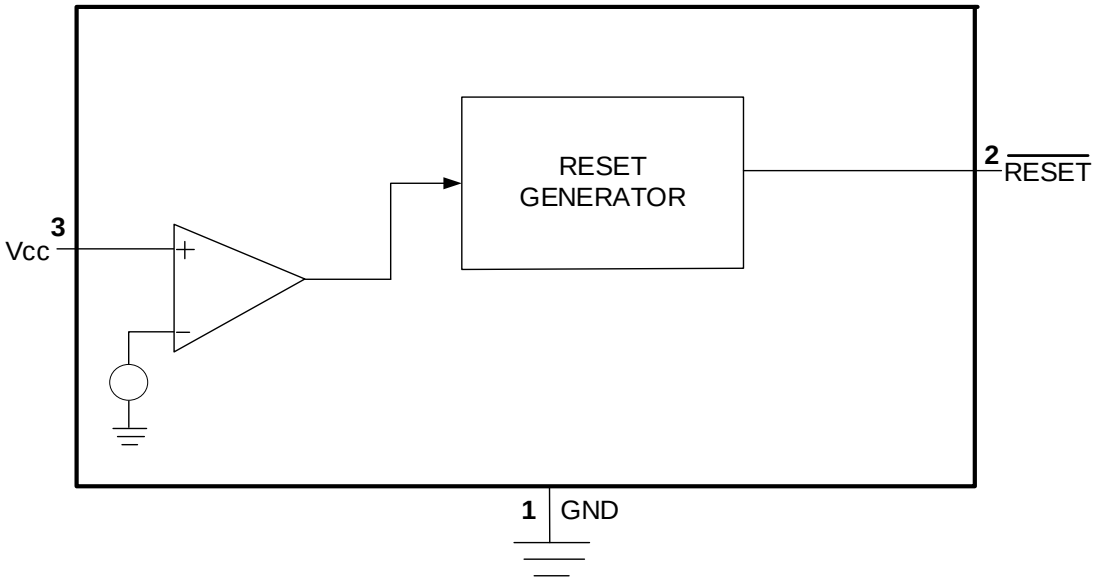


Figure 11. RESET Response Time

9 Function Block Diagram



10 Detailed Description

A microprocessor's (µP's) reset input starts the µP in a known state. The RS809 assert reset to prevent code-execution errors during power-up, power-down or brownout conditions. They assert a reset signal whenever the V_{CC} supply voltage declines below a preset threshold, keeping it asserted for at least 200ms after V_{CC} has risen above the reset threshold. The RS809 have a push-pull output stage.

11 Application and Implementation

Information in the following applications sections is not part of the RUNIC component specification, and RUNIC does not warrant its accuracy or completeness. RUNIC's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

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

When V_{CC} falls down below 1.2V, the RS809 $\overline{RESET}$ 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 12, 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 100KΩ , large enough not to load $\overline{RESET}$ and small enough to pull $\overline{RESET}$ to ground.

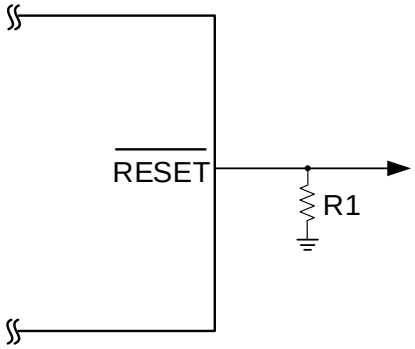


Figure 12. RESET Valid to Ground Circuit

11.2 Reset Timing

The reset signal is asserted low for the RS809 when the power supply voltage falls below the threshold trip voltage and remains asserted for at least 200ms after the power supply voltage has risen above the threshold.

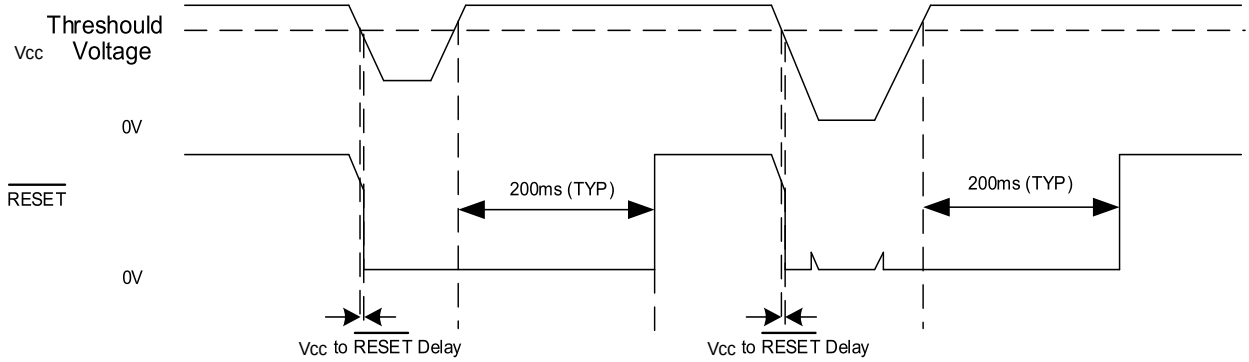
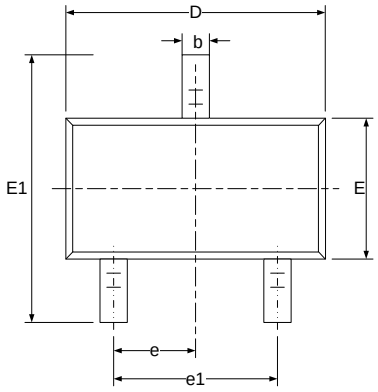
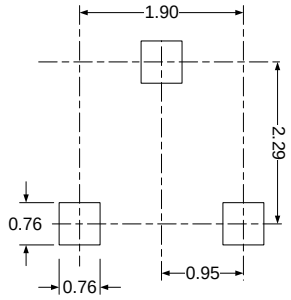


Figure 13. RESET Timing Diagram

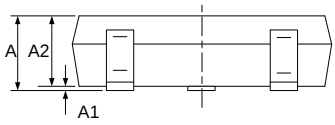
12 PACKAGE OUTLINE DIMENSIONS

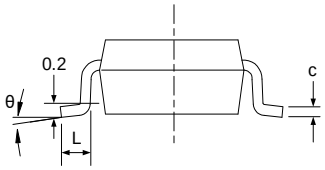
SOT23 (3)





RECOMMENDED LAND PATTERN (Unit: mm)





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
c	0.080	0.150	0.003	0.006
D (1)	2.800	3.000	0.110	0.118
E (1)	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 (BSC) (2)		0.037 (BSC) (2)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

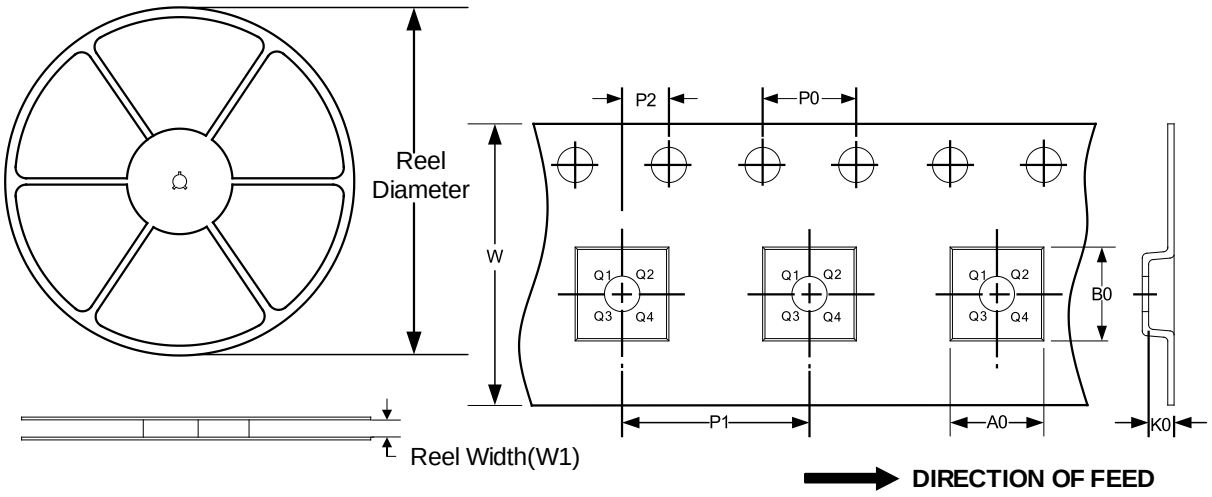
NOTE:

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

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	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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