Supply Voltage Supervisor with Reset Circuits

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, 4.65V**
- **Guaranteed $\overline{\text{RESET}}$ Valid at V_{CC}= 1.0V**
- **200ms Reset Pulse Width**
- **Voltage Monitor for Power-Fail or Low-Battery Warning**
- **Operating Temperature Range: -40°C to +85°C**
- **Push-pull, $\overline{\text{RESET}}$ Output**
- **Available in Green Package: SOT23**
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APPLICATIONS

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

DESCRIPTION

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 1.0V.
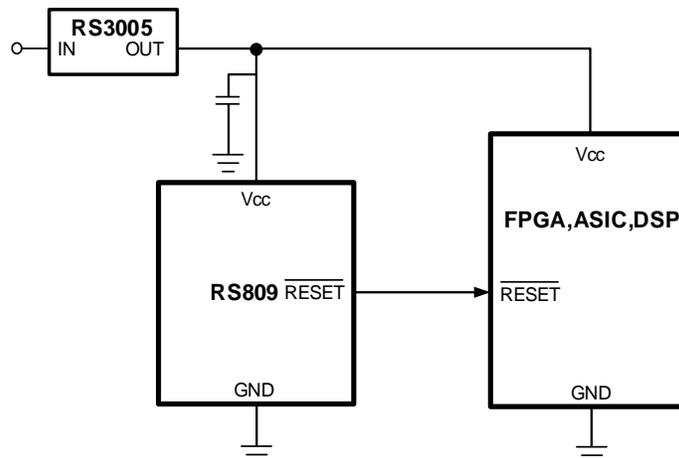
Low supply current makes the RS809 ideal for use in portable equipment. The RS809 is available in Green SOT23 package. It operates over an ambient temperature range of -40°C to +85°C.

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.
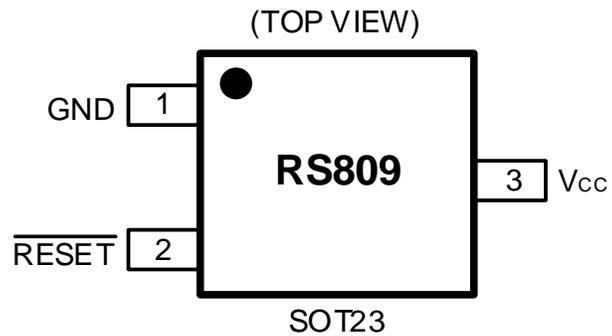
TYPICAL APPLICATION

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

PIN CONFIGURATIONS

(TOP VIEW)

SOT23

PIN DESCRIPTION

PIN SOT23	NAME	FUNCTION
1	GND	Ground, reference for all signals.
2	$\overline{RESET}$	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.

SPECIFICATIONS
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
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
T_J	Junction temperature		-65	150	°C
T_{stg}	Storage temperature		-65	150	°C
T_A	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_{CC} is provided in the *Recommended Operating Conditions table*.

ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM)	±6000	V
		Machine model (MM)	±300	V

Thermal Information:

THERMAL METRIC		RS809 3PINS SOT23	UNIT
$R_{\Theta JA}$	Junction-to-ambient thermal resistance	185.6	°C/W
$R_{\Theta JC(top)}$	Junction-to-case (top) thermal resistance	104.3	°C/W
$R_{\Theta JB}$	Junction-to-board thermal resistance	54.5	°C/W
Ψ_{JT}	Junction-to-top characterization parameter	31.0	°C/W
Ψ_{JB}	Junction-to-board characterization parameter	54.5	°C/W
$R_{\Theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	N/A	°C/W

PACKAGE/ORDERING INFORMATION

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING (1/2)	PACKAGE OPTION
RS809	RS809-2.63YSF3	-40°C ~+85°C	SOT23	809BXX	Tape and Reel,3000
	RS809-2.93YSF3	-40°C ~+85°C	SOT23	809CXX	Tape and Reel,3000
	RS809-3.08YSF3	-40°C ~+85°C	SOT23	809DXX	Tape and Reel,3000
	RS809-4.00YSF3	-40°C ~+85°C	SOT23	809EXX	Tape and Reel,3000
	RS809-4.65YSF3	-40°C ~+85°C	SOT23	809GXX	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, G represents different Reset Thresholds.
(3) XX = Date Code

MARKING INFORMATION

809 X XX

— Date code
— Reset Thresholds
— Product name
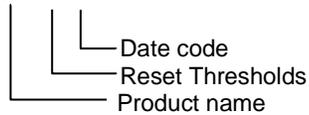
ELECTRICAL CHARACTERISTICS

V_{CC} = 2.7V to 5.5V for RS809-2.63; V_{CC} = 3V to 5.5V for RS809-2.93; V_{CC} = 3.16V to 5.5V for RS809-3.08; V_{CC} = 4.1V to 5.5V for RS809-4.00; V_{CC} = 4.77V to 5.5V for RS809-4.65; T_A = -40°C to +85°C, unless otherwise noted, typical at 25°C.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		1.0		5.5	V
Supply Current	I_{SUPPLY}			20	40	µA
Reset Threshold	V_{RT}	RS809-2.63	2.56	2.63	2.70	V
		RS809-2.93	2.86	2.93	3.00	
		RS809-3.08	3.00	3.08	3.16	
		RS809-4.00	3.90	4.00	4.10	
		RS809-4.65	4.54	4.65	4.72	
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	350	ms
Reset Threshold Temperature Coefficient				30		ppm/°C
V_{CC} to $\overline{RESET}$ delay	t_{RD}	V_{CC}=3.3V, RS809-2.93		30		µs
$\overline{RESET}$ Output voltage	High	I_{SOURCE} = 500uA	0.7xV_{CC}			V
	Low	I_{SINK} = 1.2mA			0.4	

TYPICAL OPERATING CHARACTERISTICS
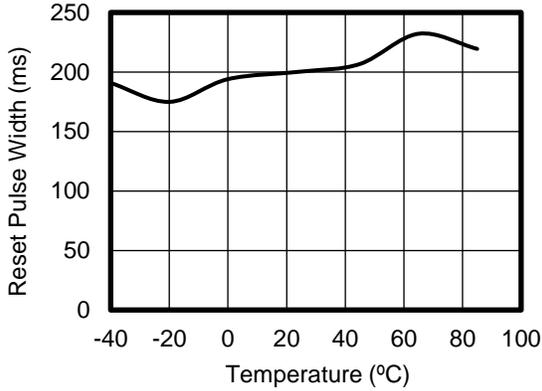
Figure 1. Reset Pulse Width vs Temperature
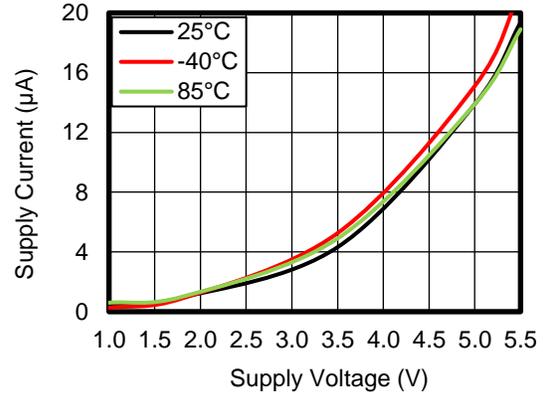
Figure 2. Supply Voltage vs Supply Current
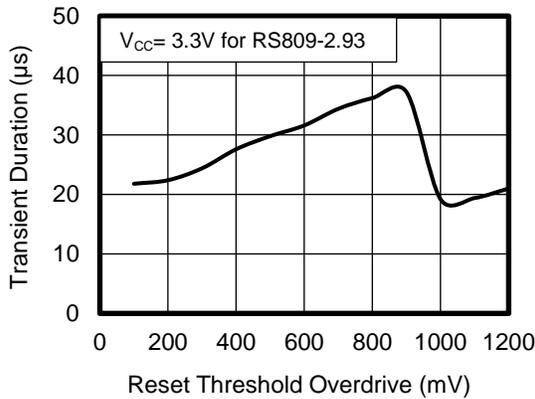
Figure 3. Transient Duration vs Reset Threshold Overdrive
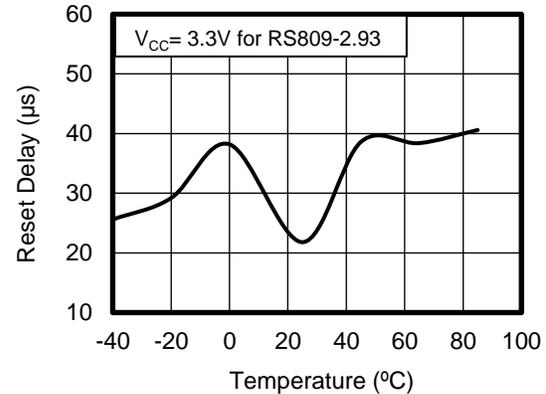
Figure 4. Reset Delay vs Temperature
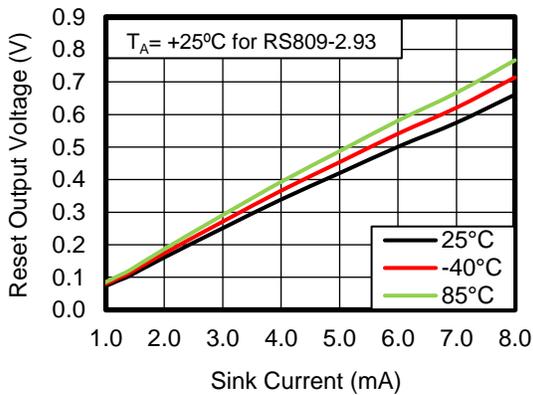
Figure 5. Reset Output Voltage vs Sink Current
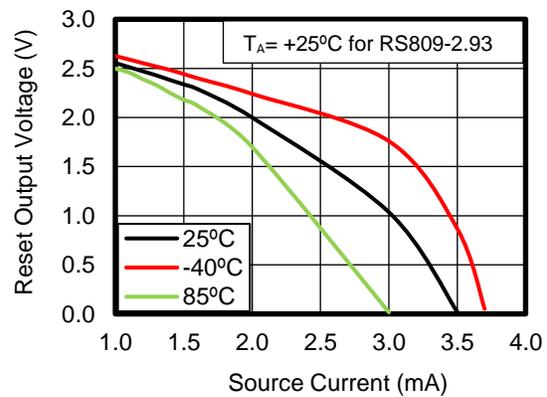
Figure 6. Reset Output Voltage vs Source Current
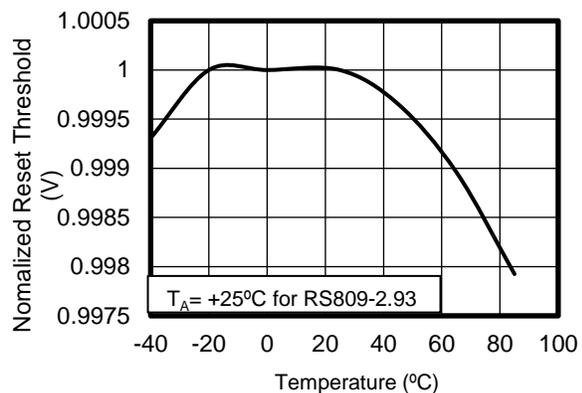
TYPICAL OPERATING CHARACTERISTICS
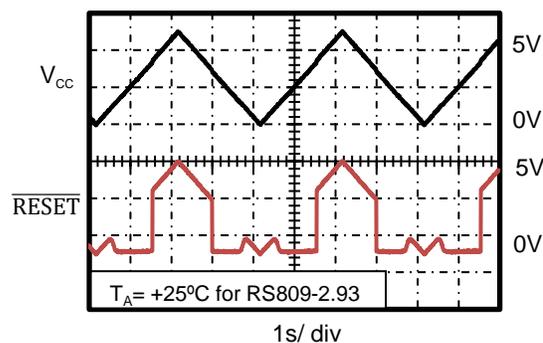

Figure 7. Normalized Reset Threshold vs Temperature

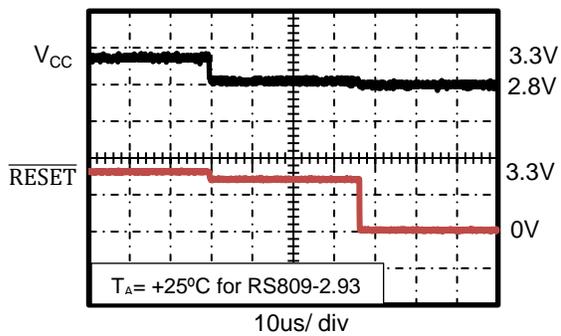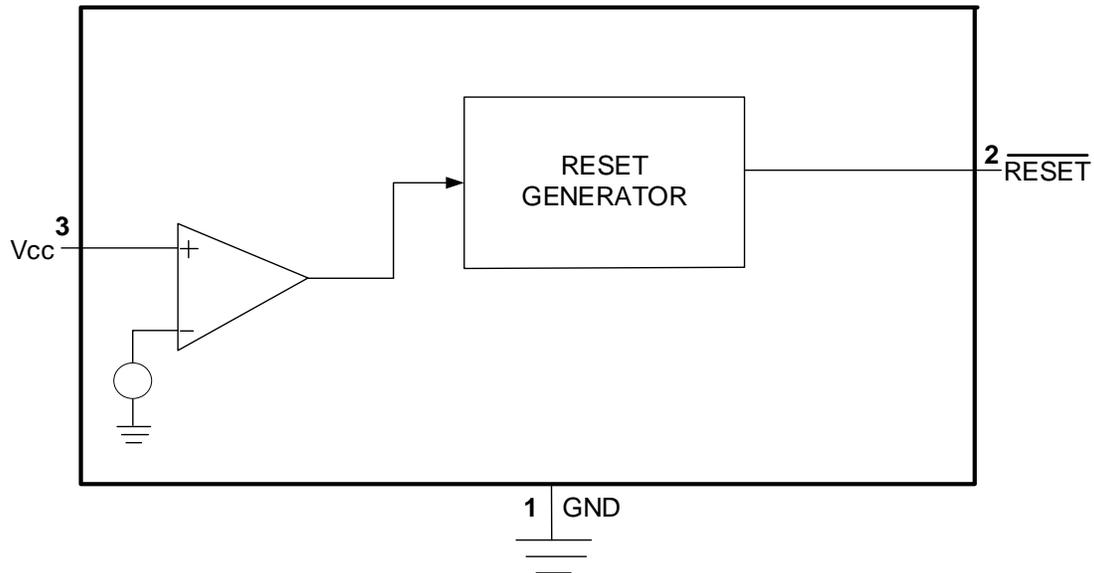**Figure 8. Reset Output Voltage vs Supply Voltage**

Figure 9. Reset Response Time

Function Block Diagram

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.

Applications Information
Ensuring a Valid RESET Output Down to V$_{CC}$=0V

When V$_{CC}$ falls down below 1V, the RS809 $\overline{\text{RESET}}$ 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 10, 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.
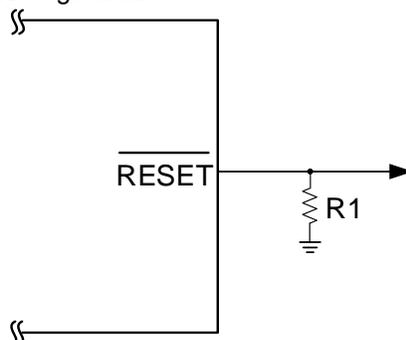
Figure 10. RESET Valid to Ground Circuit

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.
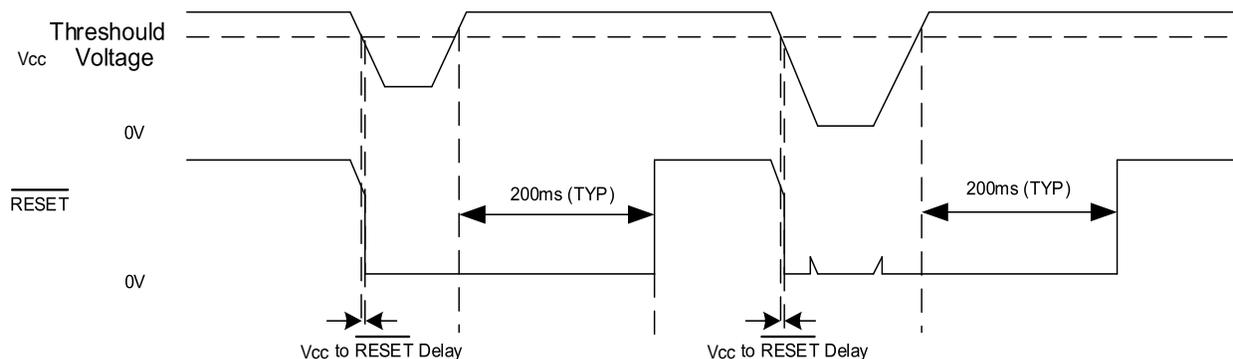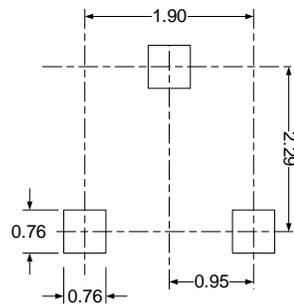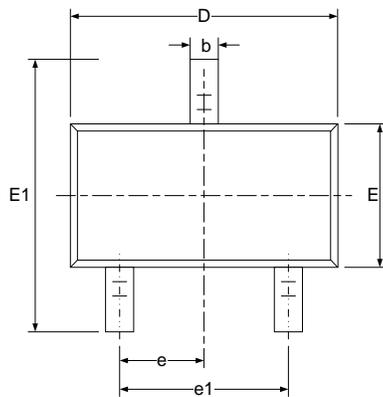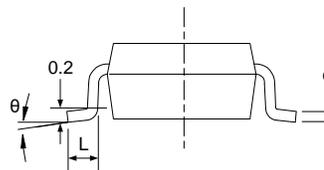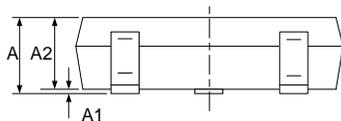
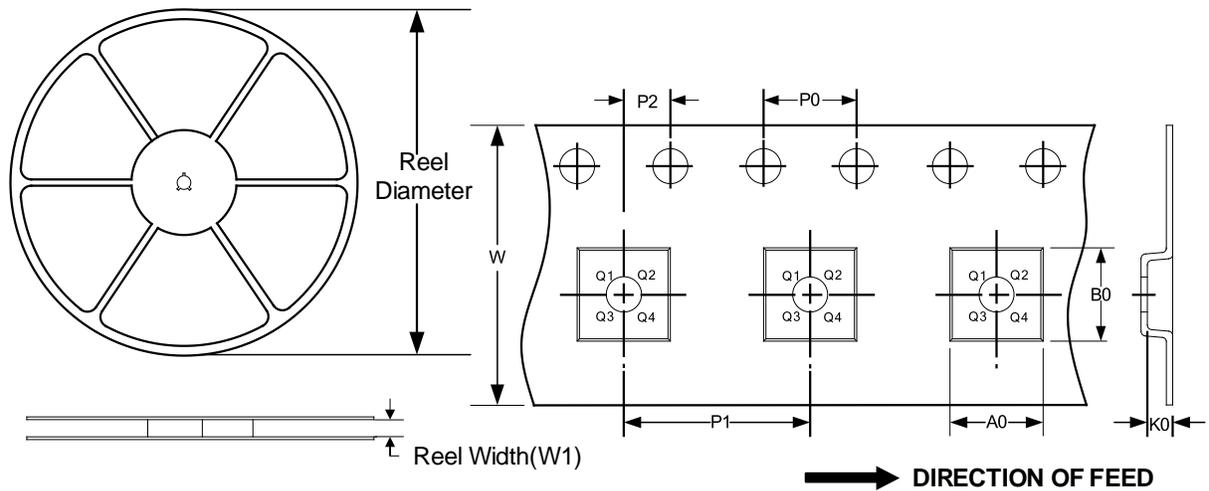**Figure 11. RESET Timing Diagram**

PACKAGE OUTLINE DIMENSIONS
SOT23

RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	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	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 (BSC)		0.037 (BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

TAPE AND REEL INFORMATION
REEL DIMENSIONS   TAPE DIMENSION

Reel Diameter

W

Reel Width(W1)

P2   P0

Q1 Q2
Q3 Q4

Q1 Q2
Q3 Q4

Q1 Q2
Q3 Q4

B0

P1

A0

K0

DIRECTION OF FEED

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