SGM802
Low-Power, SC70/SOT µP Reset Circuit with Capacitor-Adjustable Reset Timeout Delay

GENERAL DESCRIPTION

The SGM802 low-power micro-processor supervisor circuit monitors system voltages from 1.6V to 5V. This device performs a single function: it asserts a reset signal whenever the V_{CC} supply voltage falls below its reset threshold. The reset output remains asserted for the reset timeout period after V_{CC} rises above the reset threshold. The reset timeout is externally set by a capacitor to provide more flexibility.

The SGM802 has an active-high, push-pull reset output. It is available in Green SC70-4 (R) and SOT-143 packages. The SGM802 is specified over an ambient temperature range of -40℃ to +85℃.

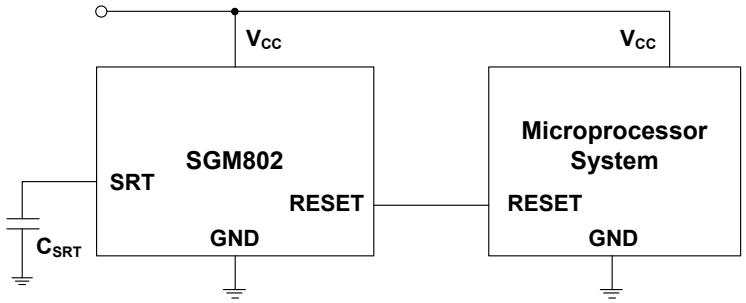
FEATURES

- **Monitor System Voltages from 1.6V to 5V**
- **Capacitor-Adjustable Reset Timeout Period**
- **Low Quiescent Current: 3µA (TYP)**
- **Push-Pull RESET Output Option**
- **Guaranteed RESET Valid to V_{CC} = 1V**
- **Immune to Short V_{CC} Transients**
- **Available in Green SC70-4 (R) and SOT-143 Packages**

APPLICATIONS

Portable Equipment
Battery-Powered Computers/Controllers
Automotive
Medical Equipment
Intelligent Instruments
Embedded Controllers
Critical µP Monitoring
Set-Top Boxes
Computers

TYPICAL APPLICATION

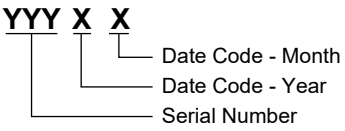


PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	RESET THRESHOLD (V)	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM802	SOT-143	1.63	SGM802-1.63YKA4G/TR	S78XX	Tape and Reel, 3000
		2.32	SGM802-2.32YKA4G/TR	S79XX	Tape and Reel, 3000
		2.63	SGM802-2.63YKA4G/TR	S7AXX	Tape and Reel, 3000
		2.93	SGM802-2.93YKA4G/TR	S7BXX	Tape and Reel, 3000
	SC70-4 (R)	1.63	SGM802-1.63YC4G/TR	S7DXX	Tape and Reel, 3000
		2.32	SGM802-2.32YC4G/TR	S7EXX	Tape and Reel, 3000
		2.63	SGM802-2.63YC4G/TR	S7FXX	Tape and Reel, 3000
		2.93	SGM802-2.93YC4G/TR	S80XX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XX = Date Code.



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS

All Voltages Referenced to GND

V_{CC} ..... -0.3V to 6V
SRT, RESET (Push-Pull) ..... -0.3V to (V_{CC} + 0.3V)
Input Current (All Pins) 20mA
Output Current (RESET) 20mA
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM 3000V
MM 300V

RECOMMENDED OPERATING CONDITIONS

Operating Temperature Range ..... -40℃ to +85℃

OVERSTRESS CAUTION

Stresses beyond those listed may cause permanent damage to the device. Functional operation of the device at these or any other conditions beyond those indicated in the operational section of the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

ESD SENSITIVITY CAUTION

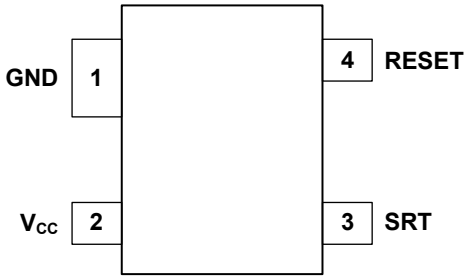
This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time.

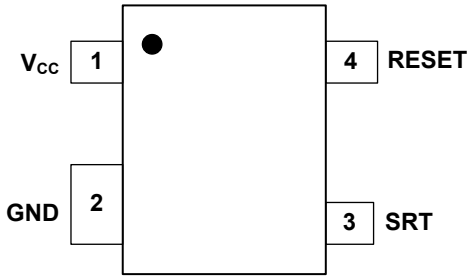
PIN CONFIGURATIONS

SGM802 (TOP VIEW)



SOT-143

SGM802 (TOP VIEW)



SC70-4 (R)

PIN DESCRIPTION

PIN		NAME	FUNCTION
SOT-143	SC70-4 (R)		
1	2	GND	Ground.
2	1	V_{CC}	Supply Voltage and Reset Threshold Monitor Input.
3	3	SRT	Set Reset Timeout Input. Connect a capacitor between SRT and ground to set the timeout period. Determine the period as follows: $t_{RP} = 2.6 \times 10^6 \times C_{SRT} + 340 \times 10^{-6}$ with t_{RP} in seconds and C_{SRT} in farads.
4	4	RESET	RESET changes from low to high whenever V_{CC} drops below the selected reset threshold voltage. RESET remains high for the reset timeout period after V_{CC} exceeds the reset threshold.

ELECTRICAL CHARACTERISTICS

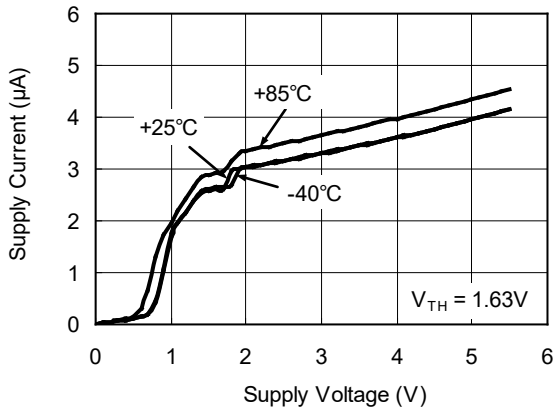
(V_{CC} = 1V to 5.5V, T_A = -40℃ to +85℃, typical values are at V_{CC} = 5V and T_A = +25℃, unless otherwise specified.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage Range	V_{CC}		1.0		5.5	V
Supply Current	I_{CC}	V_{CC} ≤ 5.0V		3.9	7.0	µA
		V_{CC} ≤ 3.3V		3.4	5.5	
		V_{CC} ≤ 2.0V		3.0	4.8	
V_{CC} Reset Threshold Accuracy	V_{TH}	T_A = +25℃	V_{TH} - 2.5%		V_{TH} + 2.5%	V
		T_A = -40℃ to +85℃	V_{TH} - 3.5%		V_{TH} + 3.5%	
Hysteresis	V_{HYST}			4 × V_{TH}		mV
V_{CC} to Reset Delay	t_{RD}	V_{CC} falling at 1mV/µs		80		µs
Reset Timeout Period	t_{RP}	C_{SRT} = 1500pF	3.00	4.25	5.75	ms
		C_{SRT} = 0		0.34		
V_{SRT} Ramp Current	I_{RAMP}	V_{SRT} = 0 to 0.65V, V_{CC} = 1.6V to 5V		210		nA
V_{SRT} Ramp Threshold	$V_{TH-RAMP}$	V_{CC} = 1.6V to 5V (V_{RAMP} rising)		0.6		V
RESET Output Voltage High	V_{OH}	V_{CC} ≥ 1.0V, I_{SOURCE} = 1µA	0.8 × V_{CC}			V
		V_{CC} ≥ 1.8V, I_{SOURCE} = 150µA	0.8 × V_{CC}			
		V_{CC} ≥ 2.7V, I_{SOURCE} = 500µA	0.8 × V_{CC}			
		V_{CC} ≥ 4.5V, I_{SOURCE} = 800µA	0.8 × V_{CC}			
RESET Output Voltage Low	V_{OL}	V_{CC} ≥ 1.8V, I_{SINK} = 500µA			0.3	V
		V_{CC} ≥ 2.7V, I_{SINK} = 1.2mA			0.3	
		V_{CC} ≥ 4.5V, I_{SINK} = 3.2mA			0.4	

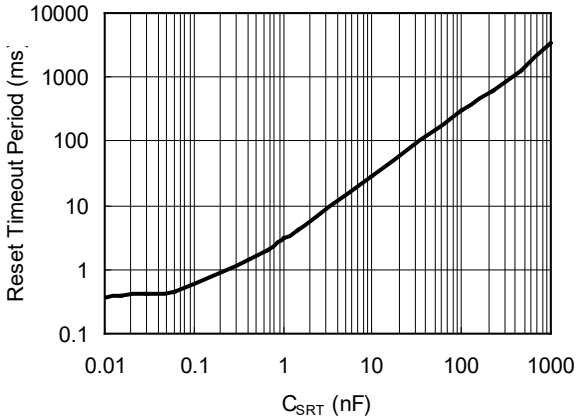
TYPICAL PERFORMANCE CHARACTERISTICS

V_{CC} = 5V, C_{SRT} = 1500pF, T_A = +25℃, unless otherwise noted.

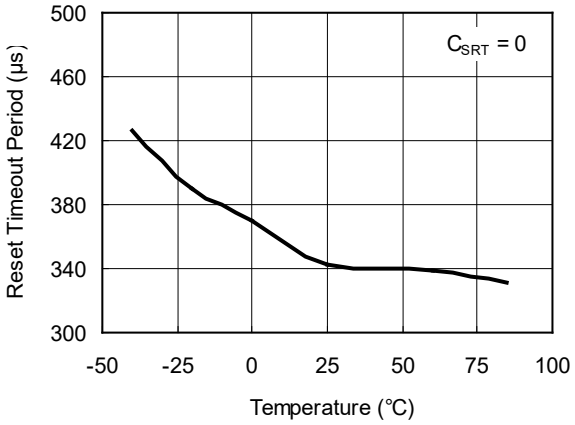
Supply Current vs. Supply Voltage



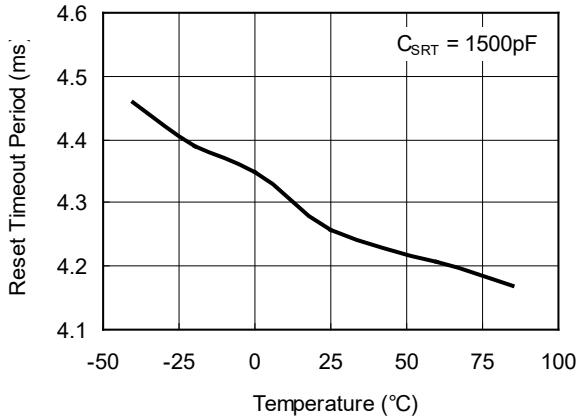
Reset Timeout Period vs. C_{SRT}



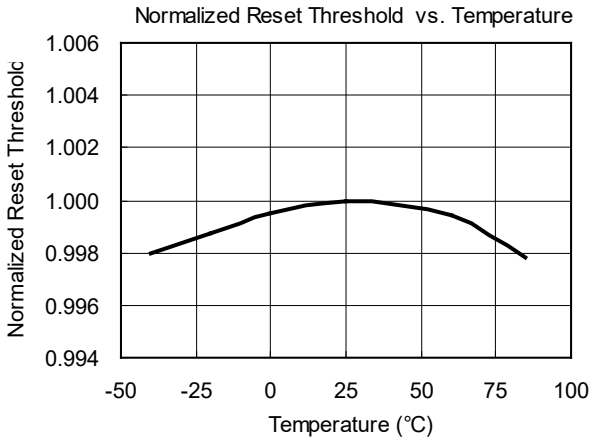
Reset Timeout Period vs. Temperature



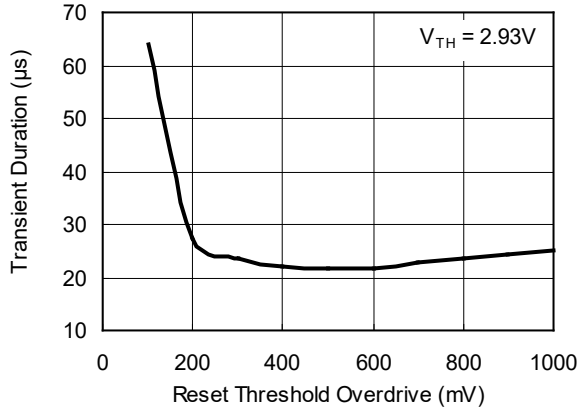
Reset Timeout Period vs. Temperature



Normalized Reset Threshold vs. Temperature



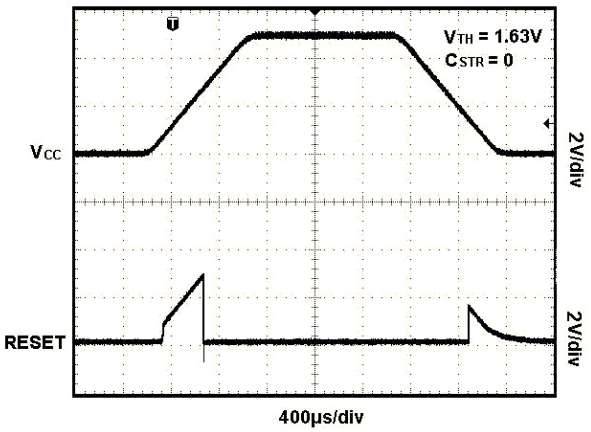
Maximum Transient Duration vs. Reset Threshold Overdrive



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

V_{CC} = 5V, C_{SRT} = 1500pF, T_A = +25℃, unless otherwise noted.

Power-up/Power-down Characteristic



DETAILED DESCRIPTION

Reset Output

The reset output is typically connected to the reset input of a µP. A µP's reset input starts or restarts the µP in a known state. The SGM802 µP supervisory circuit provides the reset logic to prevent code-execution errors during power-up, power-down, and brownout conditions.

RESET changes from low to high whenever V_{CC} drops below the threshold voltage. Once V_{CC} exceeds the threshold voltage, RESET remains high for the capacitor- adjustable reset timeout period.

This device output is guaranteed valid for V_{CC} > 1V.

Operating as a Voltage Detector

The SGM802 can be operated in a voltage detector mode by floating the SRT pin. The reset delay times for V_{CC} rising above or falling below the threshold are not significantly different. The reset output is deasserted smoothly without false pulses.

Selecting a Reset Capacitor

The reset timeout period is adjustable to accommodate a variety of µP applications. Adjust the reset timeout period (t_{RP}) by connecting a capacitor (C_{SRT}) between SRT and ground. Calculate the reset timeout capacitor as follows:

$$C_{SRT} = (t_{RP} - 340 \times 10^{-6})/(2.6 \times 10^{6})$$

where t_{RP} is in seconds and C_{SRT} is in farads.

The reset delay time is set by a current/capacitor-controlled ramp compared to an internal 0.6V reference. An internal 210nA ramp current source charges the external capacitor. The charge to the capacitor is cleared when a reset condition is detected. Once the reset condition is removed, the voltage on the capacitor ramps according to the formula: dV/dt = I/C. The C_{SRT} capacitor must ramp to 0.6V to deassert the reset. C_{SRT} must be a low-leakage (<10nA) type capacitor; ceramic is recommended.

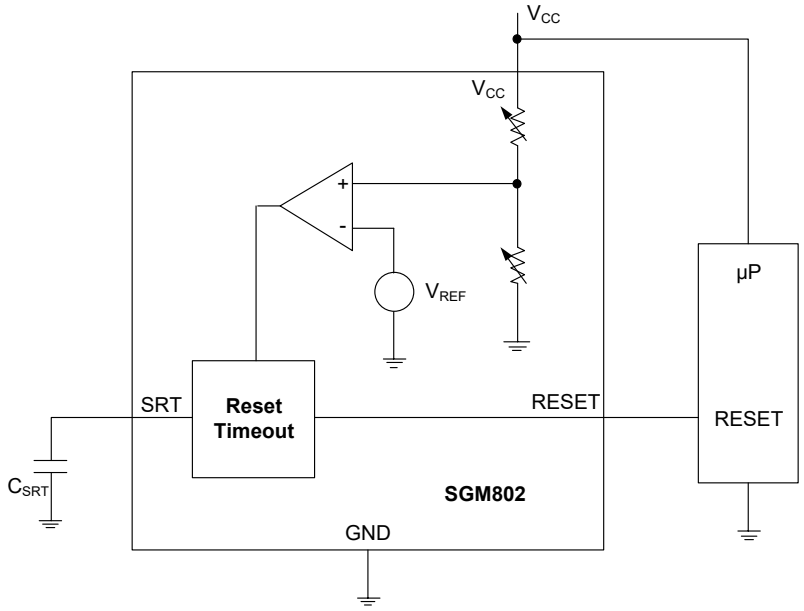


Figure 1. Typical Operating Circuit

APPLICATION INFORMATION

Negative-Going V_{CC} Transients

In addition to issuing a reset to the µP during power-up, power-down, and brownout conditions, this supervisor is relatively immune to short-duration negative-going transients (glitches). The graph Maximum Transient Duration vs. Reset Threshold Overdrive in the Typical Performance Characteristics shows this relationship.

The area below the curve of the graph is the region in which these devices typically do not generate a reset pulse. This graph was generated using a negative-going pulse applied to V_{CC}, starting above the actual reset threshold (V_{TH}) and ending below it by the magnitude indicated (reset-threshold overdrive). As the magnitude of the transient decreases (further below the reset threshold), the maximum allowable pulse width-decreases. Typically, a V_{CC} transient that goes 100mV below the reset threshold and lasts 50µs or less does not cause a reset pulse to be issued.

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

When V_{CC} falls below 1V, RESET current-sinking (sourcing) capabilities decline drastically.

For applications using the SGM802, a 100kΩ pull-up resistor between RESET and V_{CC} holds RESET high when V_{CC} falls below 1V (Figure 2).

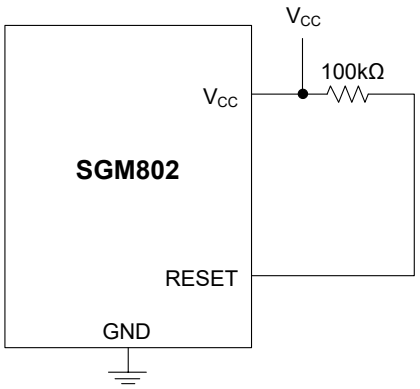


Figure 2. Ensuring RESET Valid to V_{CC} = 0

Layout Consideration

SRT is a precise current source. When developing the layout for the application, be careful to minimize board capacitance and leakage currents around this pin. Traces connected to SRT should be kept as short as possible. Traces carrying high-speed digital signals and traces with large voltage potentials should be routed as far from SRT as possible. Leakage current and stray capacitance (e.g., a scope probe) at this pin could cause errors in the reset timeout period. When evaluating these parts, use clean prototype boards to ensure accurate reset periods.

REVISION HISTORY

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

DECEMBER 2014 – REV.A.1 to REV.A.2

Added Green (RoHS & HSF) Information 2

JANUARY 2013 – REV.A to REV.A.1

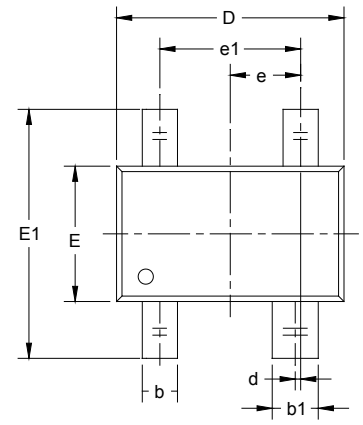
Added Tape and Reel Information section 10, 11

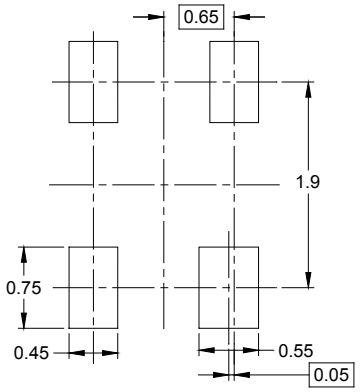
Changes from Original (MARCH 2012) to REV.A

Changed from product preview to production data ..... All

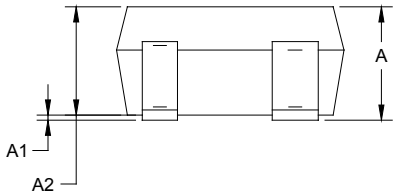
PACKAGE OUTLINE DIMENSIONS

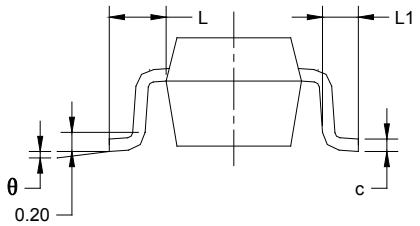
SC70-4 (R)





RECOMMENDED LAND PATTERN (Unit: mm)

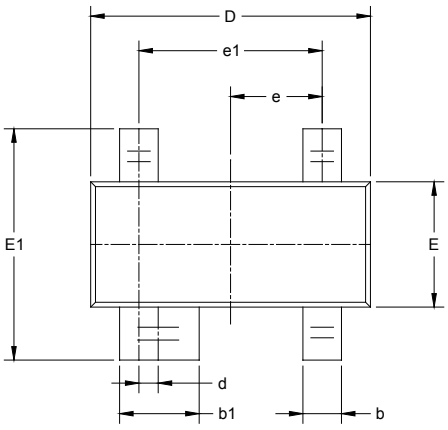


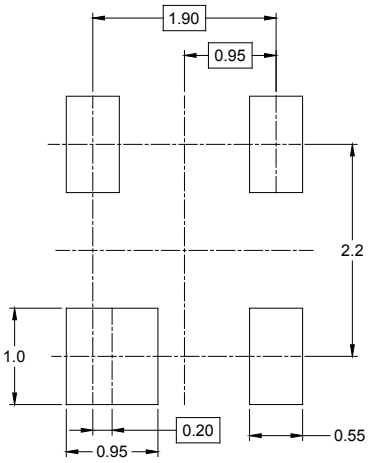


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.250	0.400	0.010	0.016
b1	0.350	0.500	0.014	0.020
c	0.080	0.150	0.003	0.006
d	0.050TYP		0.002TYP	
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

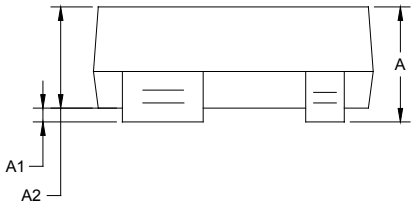
PACKAGE OUTLINE DIMENSIONS

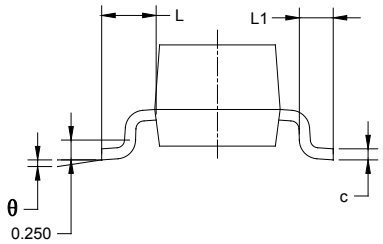
SOT-143





RECOMMENDED LAND PATTERN (Unit: mm)

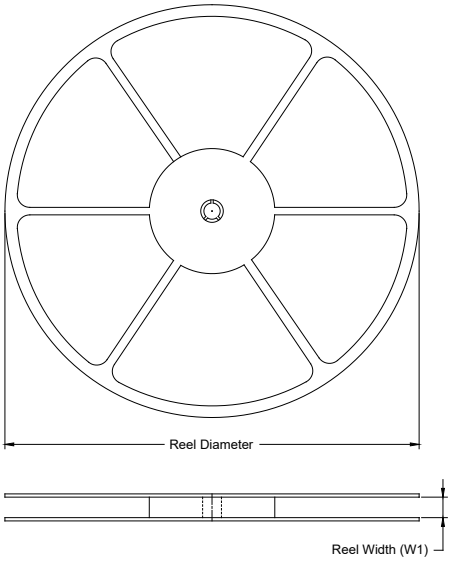




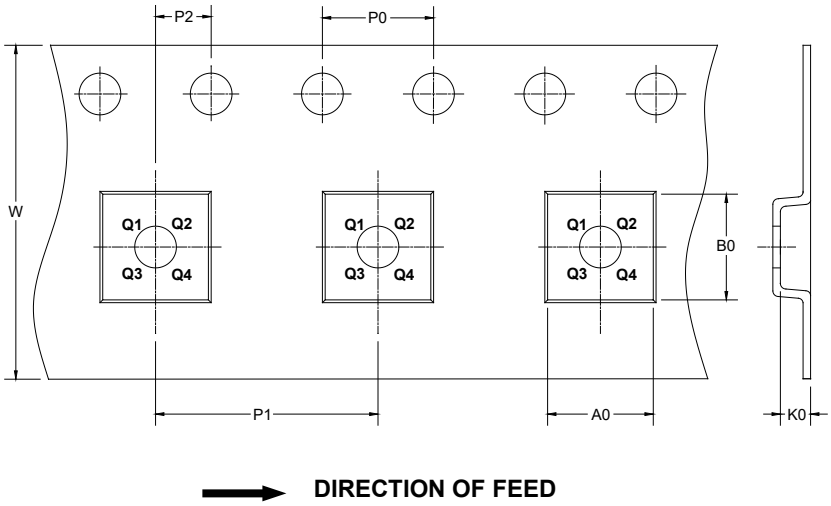
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
b1	0.750	0.900	0.030	0.035
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
d	0.200 TYP		0.008 TYP	
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.95 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.55 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



DIRECTION OF FEED

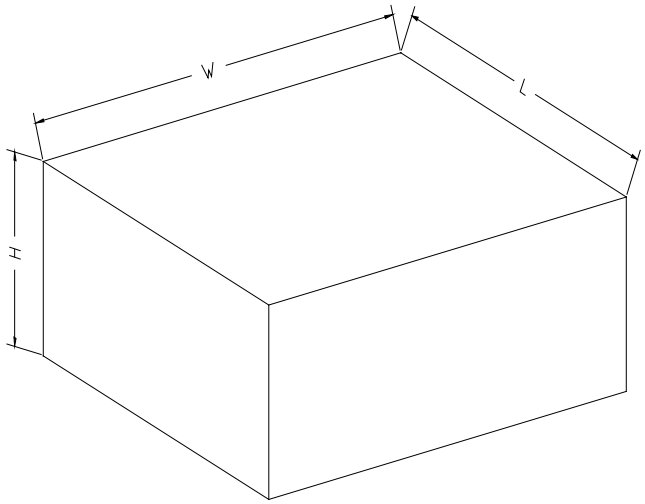
NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SC70-4 (R)	7″	9.5	3.20	2.80	1.30	4.0	4.0	2.0	8.0	Q3
SOT-143	7″	9.5	3.20	2.80	1.30	4.0	4.0	2.0	8.0	Q3

DD0001

CARTON BOX DIMENSIONS



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

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
7″ (Option)	368	227	224	8
7″	442	410	224	18

DD0002