

### GENERAL DESCRIPTION

The SGM825 microprocessor ( $\mu\text{P}$ ) supervisory circuit combines reset output and manual reset input functions in SOT-23-5 package. It significantly improves system reliability and accuracy compared to separate ICs or discrete components. The SGM825 is specifically designed to ignore fast transients on  $V_{\text{CC}}$ .

Four preprogrammed reset threshold voltages are available. This device has an active-low reset output, which is guaranteed to be in the correct state for  $V_{\text{CC}}$  down to 1V. The SGM825 offers a manual reset input and a complementary active-high reset.

The SGM825 is available in a Green SOT-23-5 package. It operates over an ambient temperature range of  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .

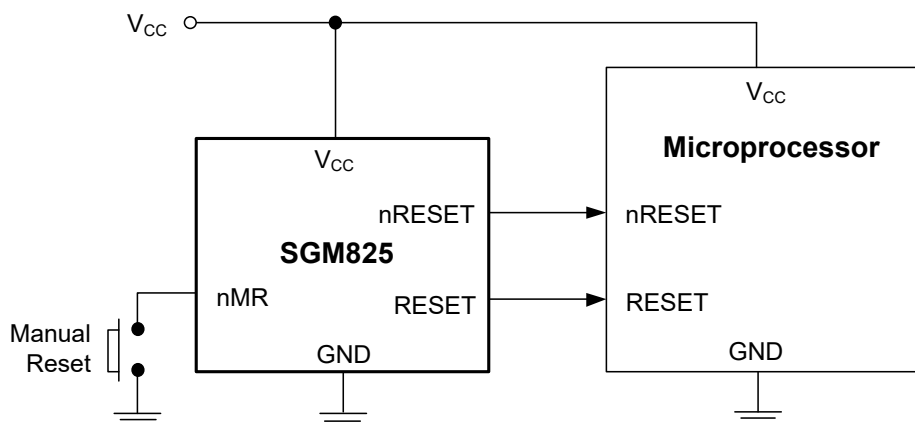
### FEATURES

- **Ultra-Low Supply Current:**  $< 1\mu\text{A}$  (TYP)
- **Precision Supply-Voltage Monitor**
  - 4.63V for SGM825-L
  - 3.08V for SGM825-T
  - 2.93V for SGM825-S
  - 2.63V for SGM825-R
- **Guaranteed Reset Valid at  $V_{\text{CC}} = 1\text{V}$**
- **Fully Specified over Temperature**
- **200ms Reset Pulse Width**
- **Power-Supply Transient Immunity**
- **Debounced TTL/CMOS-Compatible**
- **Manual Reset Input**
- **No External Components**
- **$-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  Operating Temperature Range**
- **Available in a Green SOT-23-5 Package**

### APPLICATIONS

- Computers
- Controllers
- Intelligent Instruments
- Automotive Systems
- Critical  $\mu\text{P}$  Power Monitoring

### TYPICAL APPLICATION



## PACKAGE/ORDERING INFORMATION

MODEL	RESET THRESHOLD (V)	PACKAGE DESCRIPTION	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM825	4.63	SOT-23-5	SGM825-LXN5G/TR	MZ2XX	Tape and Reel, 3000
	3.08	SOT-23-5	SGM825-TXN5G/TR	MGCXX	Tape and Reel, 3000
	2.93	SOT-23-5	SGM825-SXN5G/TR	MGDXX	Tape and Reel, 3000
	2.63	SOT-23-5	SGM825-RXN5G/TR	MGEXX	Tape and Reel, 3000

## MARKING INFORMATION

NOTE: XX = Date Code.

YYY X X

Date Code - Week

Date Code - Year

Serial Number

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

Terminal Voltage (With respect to GND)

 $V_{CC}$  ..... -0.3V to 6.0VAll Other Inputs ..... -0.3V to ( $V_{CC} + 0.3V$ )

Input Current

 $V_{CC}$  ..... 20mA

GND ..... 20mA

Output Current

All outputs ..... 20mA

Package Thermal Resistance

SOT-23-5,  $\theta_{JA}$  ..... 234°C/W

Junction Temperature ..... +150°C

Storage Temperature Range ..... -65°C to +150°C

Lead Temperature (Soldering, 10s) ..... +260°C

ESD Susceptibility

HBM ..... 4000V

MM ..... 400V

CDM ..... 1000V

## RECOMMENDED OPERATING CONDITIONS

Ambient Temperature Range ..... -40°C to +125°C

## OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

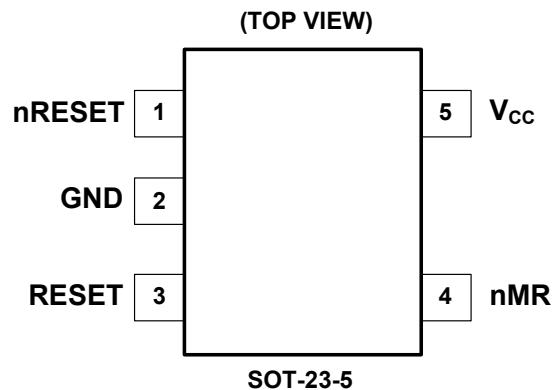
## ESD SENSITIVITY CAUTION

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, or specifications without prior notice.

## PIN CONFIGURATION



## PIN DESCRIPTION

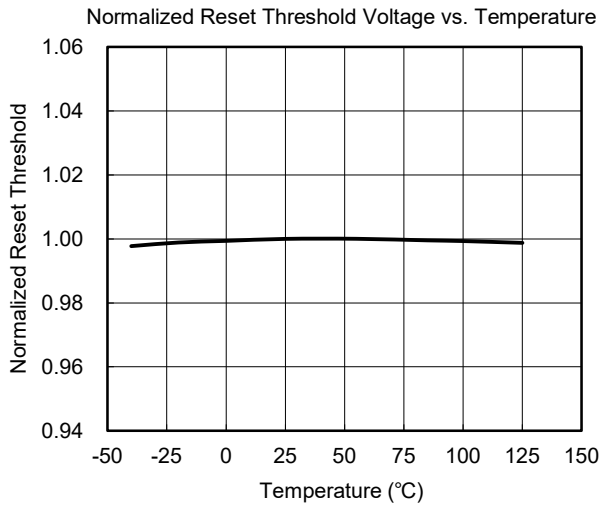
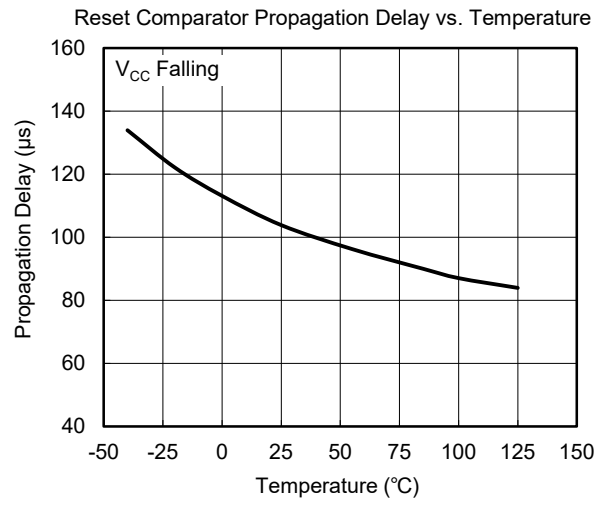
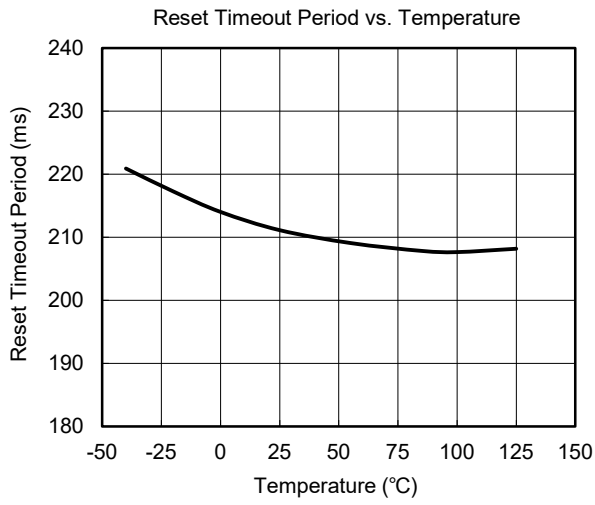
NAME	FUNCTION
nRESET	Active-Low Reset Output. Pulses low for 200ms when triggered, and remains low whenever V <sub>CC</sub> is below the reset threshold or when nMR is a logic low. It remains low for 200ms after one of the following occurs: V <sub>CC</sub> rises above the reset threshold, or nMR goes from low to high.
GND	Ground. 0V ground reference for all signals.
RESET	Active-High Reset Output. Inverse of nRESET.
nMR	Manual Reset Input Pin. A logic low on nMR asserts reset. Reset remains asserted as long as nMR is held low and for 200ms after nMR returns high. The active-low input has an internal 59kΩ pull-up resistor. It can be driven from a CMOS logic line or shorted to ground with a switch. Leave open or connect to V <sub>CC</sub> if unused.
V <sub>CC</sub>	Supply Voltage.

## ELECTRICAL CHARACTERISTICS

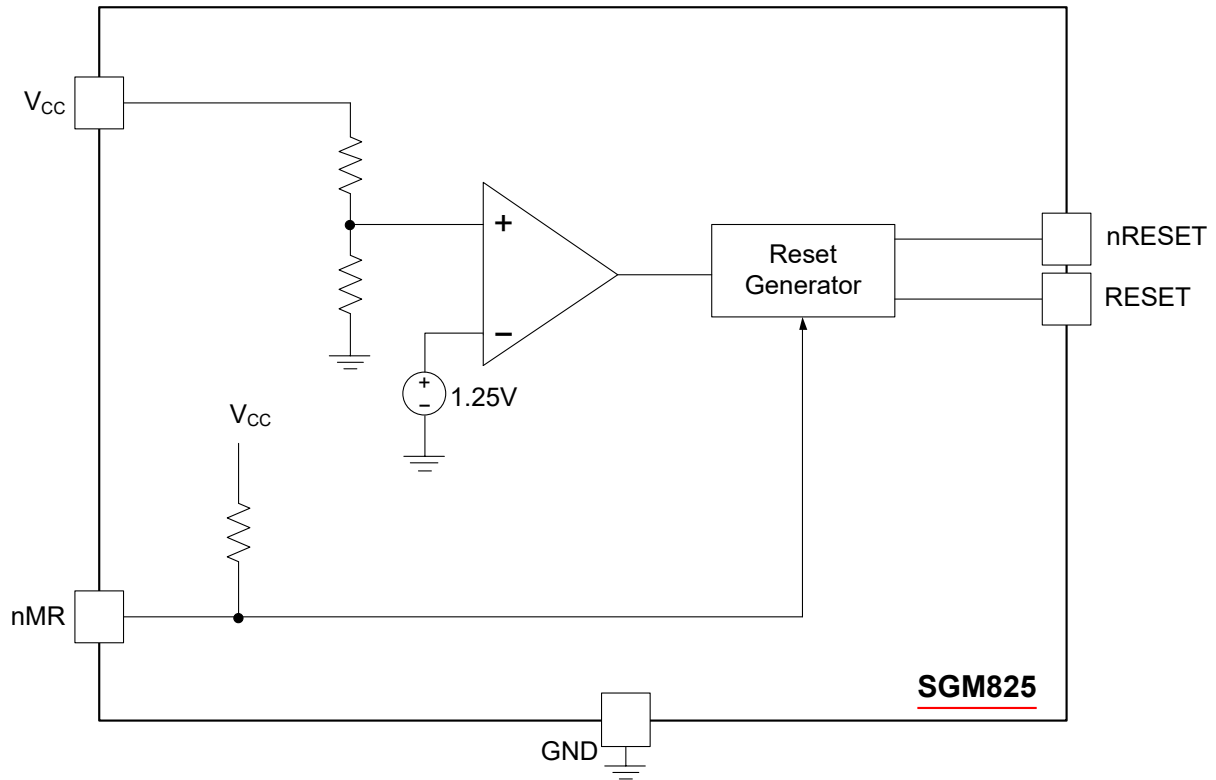
( $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 4.73\text{V}$  to  $5.5\text{V}$  for SGM825-L,  $V_{CC} = 3.14\text{V}$  to  $5.5\text{V}$  for SGM825-T,  $V_{CC} = 2.99\text{V}$  to  $5.5\text{V}$  for SGM825-S,  $V_{CC} = 2.68\text{V}$  to  $5.5\text{V}$  for SGM825-R, Full =  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$ , unless otherwise noted.)

PARAMETER		CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Operating Voltage Range ( $V_{CC}$ )			Full	1		5.5	V
Supply Current ( $I_{SUPPLY}$ )		$V_{CC} = 3.6\text{V}$	Full		0.5	1.2	$\mu\text{A}$
		$V_{CC} = 5.5\text{V}$	Full		0.7	1.4	
Reset Threshold ( $V_{RST}$ )		SGM825-L	$+25^\circ\text{C}$	4.55	4.63	4.70	V
			Full	4.54	4.63	4.73	
		SGM825-T	$+25^\circ\text{C}$	3.03	3.08	3.13	
			Full	3.02	3.08	3.14	
		SGM825-S	$+25^\circ\text{C}$	2.88	2.93	2.98	
			Full	2.87	2.93	2.99	
SGM825-R	$+25^\circ\text{C}$	2.59	2.63	2.67			
	Full	2.58	2.63	2.68			
Reset Threshold Hysteresis		SGM825-L	$+25^\circ\text{C}$		20		mV
		SGM825-T	$+25^\circ\text{C}$		14		
		SGM825-S	$+25^\circ\text{C}$		13		
		SGM825-R	$+25^\circ\text{C}$		12		
Reset Threshold Temperature Coefficient			Full		20		ppm/ $^\circ\text{C}$
Reset Pulse Width ( $t_{RP}$ )			Full	140	200	290	ms
nRESET Output Voltage		$V_{OH}$	SGM825-L, $V_{CC} = V_{RST(MAX)}$ , $I_{SOURCE} = 120\mu\text{A}$	Full	$V_{CC} - 1.5$		V
			SGM825-T/S/R, $V_{CC} = V_{RST(MAX)}$ , $I_{SOURCE} = 30\mu\text{A}$	Full	$0.8 \times V_{CC}$		
		$V_{OL}$	SGM825-L, $V_{CC} = V_{RST(MIN)}$ , $I_{SINK} = 3.2\text{mA}$	Full		0.4	
			SGM825-T/S/R, $V_{CC} = V_{RST(MIN)}$ , $I_{SINK} = 1.2\text{mA}$	Full		0.3	
$V_{CC} = 1\text{V}$ , $V_{CC}$ falling, $I_{SINK} = 50\mu\text{A}$	Full			0.3			
nRESET Output Short-Circuit Current ( $I_{SOURCE}$ )		SGM825-L, nRESET = 0V, $V_{CC} = 5.5\text{V}$	Full			460	$\mu\text{A}$
		SGM825-T/S/R, nRESET = 0V, $V_{CC} = 3.6\text{V}$	Full			430	
RESET Output Voltage		$V_{OH}$	$V_{CC} > 1.8\text{V}$ , $I_{SOURCE} = 150\mu\text{A}$	Full	$0.8 \times V_{CC}$		V
		$V_{OL}$	SGM825-L, $V_{CC} = V_{RST(MAX)}$ , $I_{SINK} = 3.2\text{mA}$	Full		0.4	
			SGM825-T/S/R, $V_{CC} = V_{RST(MAX)}$ , $I_{SINK} = 1.2\text{mA}$	Full		0.3	
$V_{CC}$ to Reset Delay ( $t_{RD}$ )		$V_{RST} - V_{CC} = 100\text{mV}$	$+25^\circ\text{C}$		110		$\mu\text{s}$
nMR Input Voltage		$V_{IL}$	Full			0.8	V
		$V_{IH}$	Full	2			
nMR Pulse Width ( $t_{MR}$ )			Full	300			ns
nMR Noise Immunity (Pulse width with no reset)			$+25^\circ\text{C}$		130		ns
nMR to Reset Out Delay ( $t_{MD}$ )			Full			470	ns
nMR Pull-Up Resistance (Internal)			Full	44	59	78	k $\Omega$

**TYPICAL PERFORMANCE CHARACTERISTICS**



FUNCTIONAL BLOCK DIAGRAM



## DETAILED DESCRIPTION

### Reset Output

A microprocessor's ( $\mu P$ 's) reset input starts the  $\mu P$  in a known state. The SGM825  $\mu P$  supervisory circuit asserts a reset to prevent code-execution errors during power-up, power-down and brownout conditions. nRESET is guaranteed to be a logic low for  $V_{CC}$  down to 1V. Once  $V_{CC}$  exceeds the reset threshold, an internal timer keeps nRESET low for the specified reset timeout period ( $t_{RP}$ ); after this interval, nRESET returns high (Figure 1).

If a brownout condition occurs ( $V_{CC}$  dips below the reset threshold), nRESET goes low. Each time nRESET is asserted, it stays low for the reset timeout period. Any time  $V_{CC}$  goes below the reset threshold, the internal timer restarts. nRESET both sources and sinks current. RESET on the SGM825 is the inverse of nRESET.

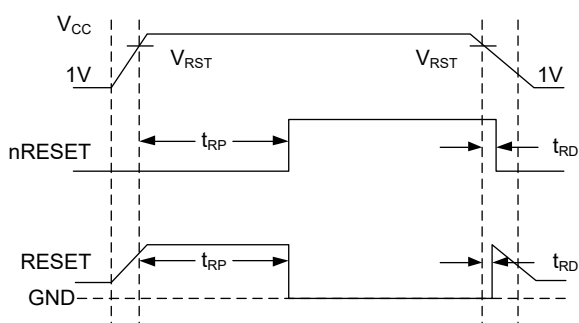


Figure 1. nRESET Timing Diagram

### Manual Reset Input

Many  $\mu P$ -based products require manual reset capability, allowing the operator, a test technician, or external logic circuitry to initiate a reset. On the SGM825, a logic low on nMR asserts reset. Reset remains asserted while nMR is low, and for  $t_{RP}$  (200ms nominal) after it returns high. nMR has an internal 59k $\Omega$  pull-up resistor, so it can be left open if not used. This input can be driven with CMOS logic levels or with open-drain/collector outputs. Connect a normally open

momentary switch from nMR to GND to create a manual reset function; external debounce circuitry is not required. If nMR is driven from long cables or the device is used in a noisy environment, connect a 0.1 $\mu F$  capacitor from nMR to GND to provide additional noise immunity.

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

The nRESET output maximum pull-up current is 460 $\mu A$  for L version (430 $\mu A$  for T/S/R versions). This allows  $\mu P$ s with bidirectional resets, such as the 68HC11, to force nRESET low when the SGM825 is pulling nRESET high (Figure 2).

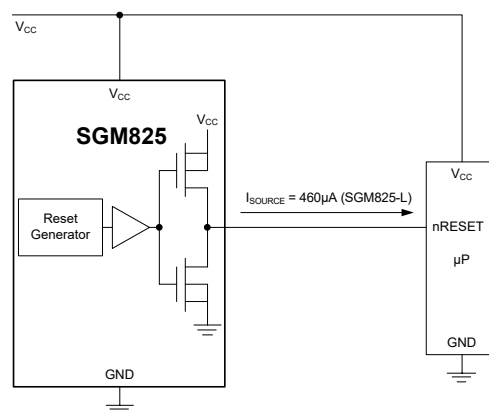


Figure 2. Interfacing to  $\mu P$  with Bidirectional Resets

### Negative-Going $V_{CC}$ Transients

This supervisor is relatively immune to short duration, negative-going  $V_{CC}$  transients (glitches), which usually do not require the entire system to shut down. Resets are issued to the  $\mu P$  during power-up, power-down and brownout conditions.

An optional 0.1 $\mu F$  bypass capacitor mounted close to  $V_{CC}$  provides additional transient immunity.

## REVISION HISTORY

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

### MAY 2019 – REV.A to REV.A.1

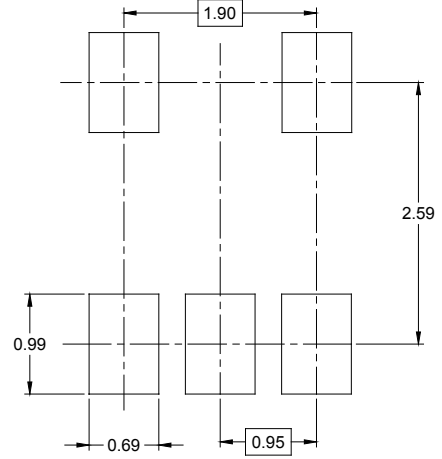
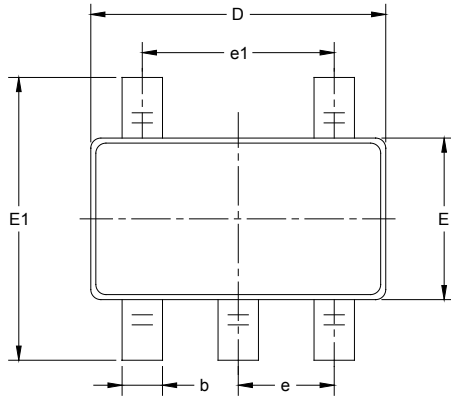
	Page
Changed Typical Performance Characteristics section .....	5

### Changes from Original (DECEMBER 2018) to REV.A

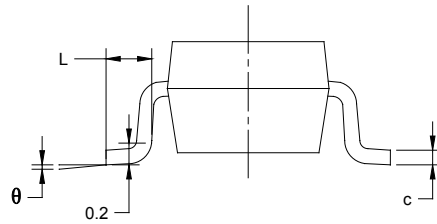
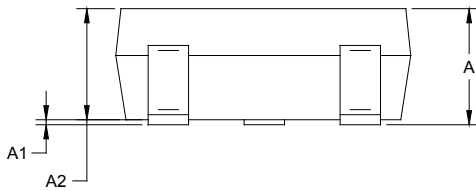
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PACKAGE OUTLINE DIMENSIONS

SOT-23-5



RECOMMENDED LAND PATTERN (Unit: mm)



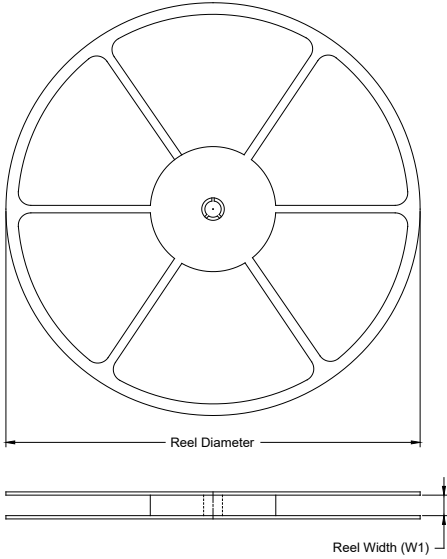
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.900 BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
$\theta$	0°	8°	0°	8°



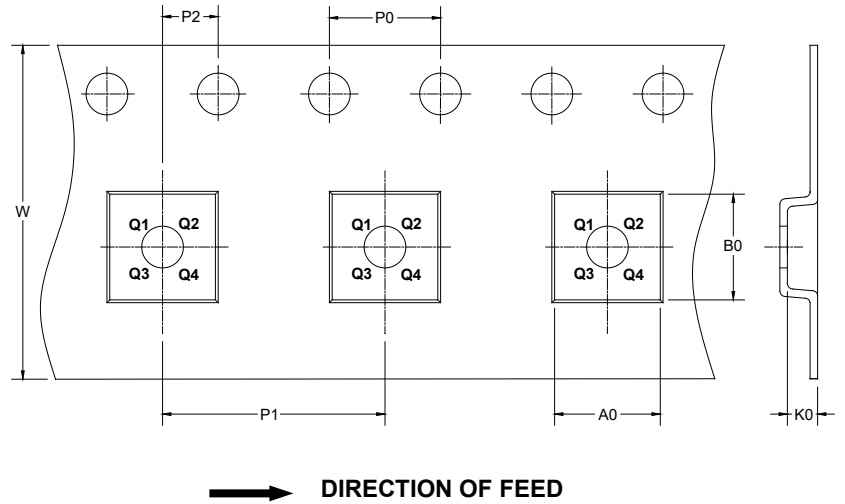
# PACKAGE INFORMATION

## TAPE AND REEL INFORMATION

### REEL DIMENSIONS



### TAPE DIMENSIONS



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

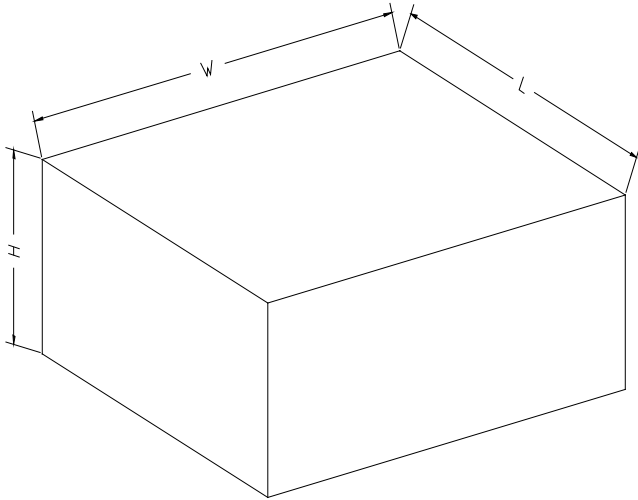
### KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOT-23-5	7"	9.5	3.20	3.20	1.40	4.0	4.0	2.0	8.0	Q3

DD0001

# PACKAGE INFORMATION

## 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