



# SGM8749

## 150ns, 3V/5V, Single-Supply, Low Power, Rail-to-Rail Input Comparator

---

### GENERAL DESCRIPTION

The SGM8749 is a single, high speed, low power comparator, which features a fast 150ns propagation delay. The device is optimized for low voltage operation on 3V or 5V supply, and consumes only 22 $\mu$ A supply current.

The SGM8749 supports rail-to-rail input operation. The input common mode voltage range is from -0.1V to  $V_{CC}$  + 0.1V. The device has an open-drain output structure that needs external pull-up resistor. Any input or output pin has a continuous short-circuit protection to both power supply rails.

The SGM8749 is available in Green SOT-23-5 and SC70-5 packages. It is rated over the -40°C to +85°C temperature range.

### FEATURES

- **Low Propagation Delay: 150ns (Overdrive = 10mV)**
- **Low Supply Current: 22 $\mu$ A (TYP) at  $V_{CC}$  = 3V**
- **Low Offset Voltage: 0.8mV (TYP)**
- **Rail-to-Rail Input**
- **Supply Voltage Range: 2.7V to 5.5V**
- **Optimized for 3V and 5V Applications**
- **Open-Drain Output**
- **Output Swing with 4mA Output Current: 185mV (TYP)**
- **Supports CMOS or TTL Logic**
- **-40°C to +85°C Operating Temperature Range**
- **Available in Green SOT-23-5 and SC70-5 Packages**

### APPLICATIONS

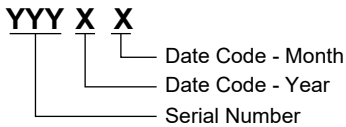
3V or 5V Applications  
Portable/Battery-Powered Equipment  
Mobile Phones  
Zero-Crossing Detectors  
Threshold Detectors  
Line Receiver Units

**PACKAGE/ORDERING INFORMATION**

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM8749	SOT-23-5	-40°C to +85°C	SGM8749YN5G/TR	SS2XX	Tape and Reel, 3000
	SC70-5	-40°C to +85°C	SGM8749YC5G/TR	SS1XX	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**

- Supply Voltage,  $V_{CC}$  to GND.....6V
- Differential Input Voltage,  $V_{IN}$ ..... $\pm(V_{CC} - GND)$
- Voltage at Input/Output Pins.....-0.3V to ( $V_{CC} + 0.3V$ )
- Junction Temperature.....+150°C
- Storage Temperature Range.....-65°C to +150°C
- Lead Temperature (Soldering, 10s).....+260°C
- ESD Susceptibility
- HBM.....2000V
- MM.....400V

**RECOMMENDED OPERATING CONDITIONS**

- Operating Temperature Range.....-40°C to +85°C
- Operating Supply Voltage Range.....2.7V to 5.5V

**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**

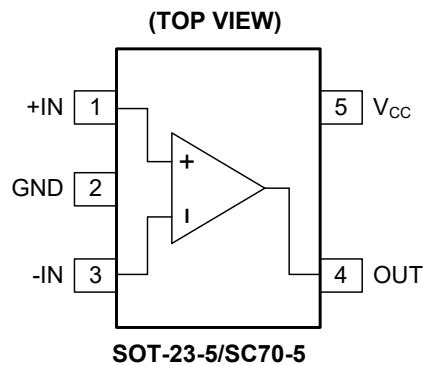
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions.

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 even small parametric changes could cause the device not to meet the published specifications.

**DISCLAIMER**

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

**PIN CONFIGURATIONS**



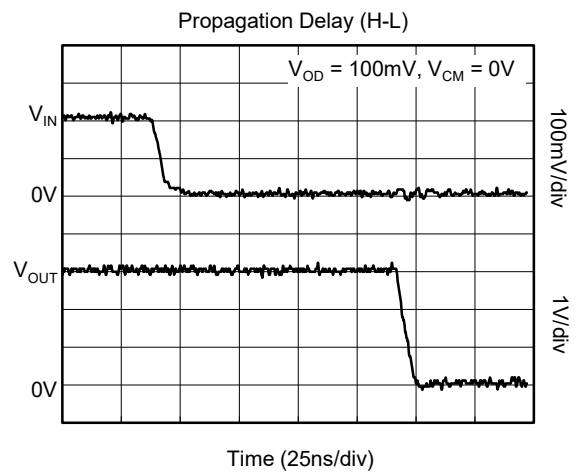
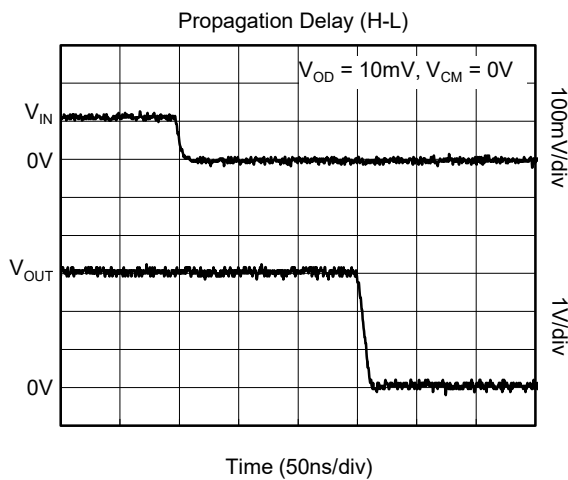
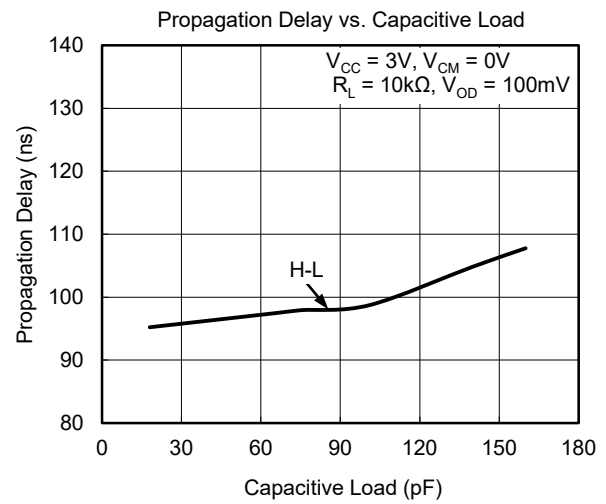
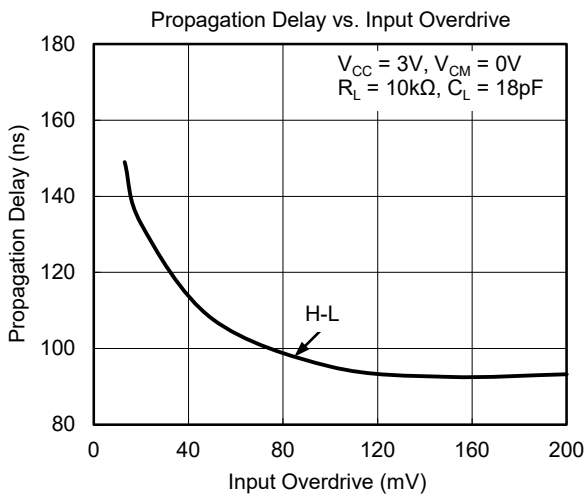
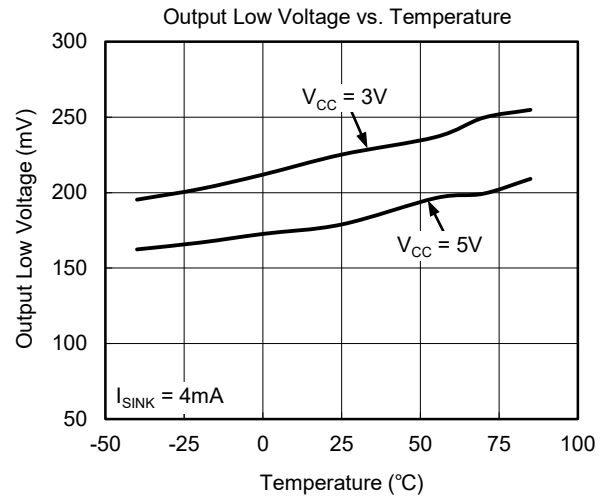
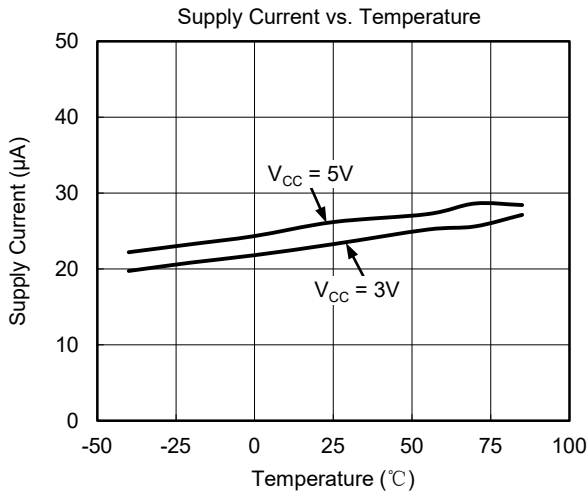
**ELECTRICAL CHARACTERISTICS**(V<sub>CC</sub> = 5V, V<sub>CM</sub> = 0V, C<sub>L</sub> = 15pF, typical values are at T<sub>A</sub> = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Supply Voltage Range <sup>(1)</sup>	V <sub>CC</sub>		2.7		5.5	V
Input Common Mode Voltage Range <sup>(2)</sup>	V <sub>CM</sub>		-0.1		V <sub>CC</sub> + 0.1	V
Input Offset Voltage	V <sub>OS</sub>	V <sub>CC</sub> = 5V, V <sub>CM</sub> = 0V, Out = 0V		0.8	4.5	mV
		-40°C to +85°C			4.7	
		V <sub>CC</sub> = 5V, V <sub>CM</sub> = 5V, Out = 0V		0.9	4.8	
		-40°C to +85°C			4.9	
Output Short-Circuit Current	I <sub>SINK</sub>	V <sub>CC</sub> = 5V, Out to V <sub>CC</sub> /2		-33	-28	mA
		-40°C to +85°C			-22	
Common Mode Rejection Ratio <sup>(3)</sup>	CMRR	V <sub>CC</sub> = 5V, V <sub>CM</sub> = 0V to 5V	60	77		dB
		-40°C to +85°C	58			
Power Supply Rejection Ratio	PSRR	V <sub>CM</sub> = 0V, V <sub>CC</sub> = 2.7V to 5.5V	68	79		dB
		-40°C to +85°C	66			
Output Voltage Swing from Rail	V <sub>OL</sub>	V <sub>CC</sub> = 5V, I <sub>OUT</sub> = -4mA		185	218	mV
		-40°C to +85°C			262	
Supply Current	I <sub>S</sub>	V <sub>CC</sub> = 3V, V <sub>OUT</sub> = L, I <sub>OUT</sub> = 0mA		22	32	μA
		-40°C to +85°C			38	
		V <sub>CC</sub> = 5V, V <sub>OUT</sub> = L, I <sub>OUT</sub> = 0mA		25	35	
		-40°C to +85°C			44	
Propagation Delay (High to Low)		V <sub>CC</sub> = 3V, Overdrive = 10mV		150		ns
		V <sub>CC</sub> = 3V, Overdrive = 100mV		97		
Fall Time	t <sub>FALL</sub>	Overdrive = 10mV		8		ns
		Overdrive = 100mV		6		

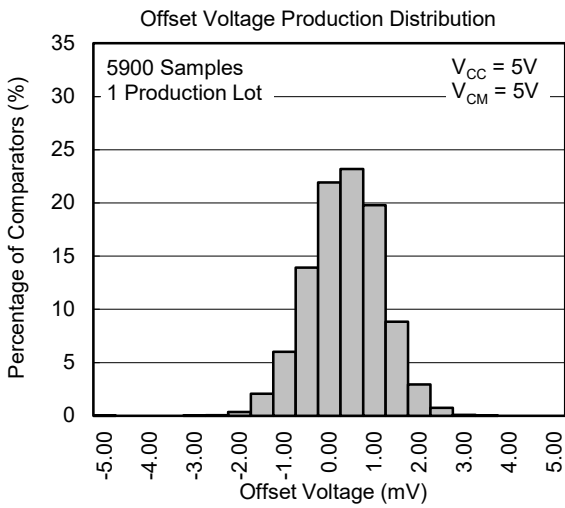
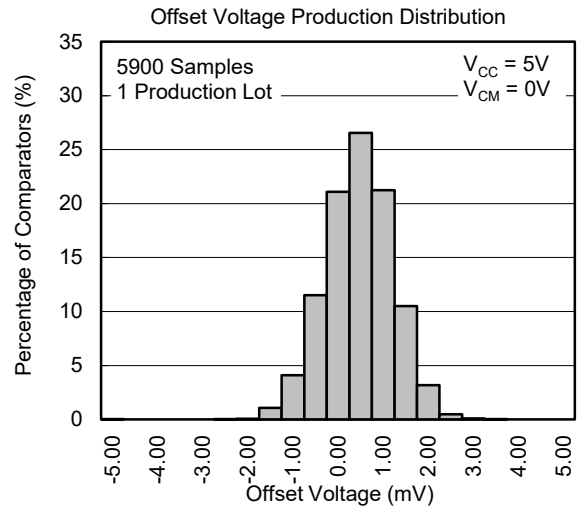
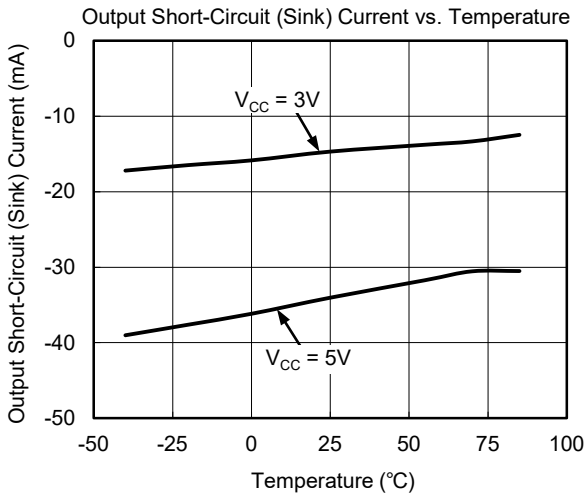
## NOTES:

1. This value is from PSRR test.
2. This value is from PD test. For the range of common mode voltage, the maximum input common mode voltage can reach V<sub>CC</sub> + 0.1V without any damage to SGM8749.
3. CMRR is defined over the condition of whole input common mode range.

TYPICAL PERFORMANCE CHARACTERISTICS



TYPICAL PERFORMANCE CHARACTERISTICS (continued)



**DETAILED DESCRIPTION**

The SGM8749 is a single, high speed, low power comparator optimized for low voltage operation from 2.7V to 5.5V single supply. The device supports rail-to-rail input operation. It is suitable for portable equipment. Open-drain structure needs external pull-up resistor. The SGM8749 can be compatible with CMOS and TTL logics.

**Output Structure**

In Figure 1, the SGM8749 has an open-drain output stage. When output is changed from logic high to low, the changed sink current pulls output pin to logic low. Beginning this transition, larger sink current is used to create a high slew rate transit from high to low. Once the output voltage reaches  $V_{OL}$ , it will reduce the sink current to a just right value to maintain the  $V_{OL}$  static condition. This current-driven open-drain output stage will significantly reduce the power consumption in application system.

If low slew rate transition is needed in system design, adjusting the load capacitance will change the slew rate. The heavier capacitive load will slow down the output voltage transition. This feature will be used to reduce the interference generated by fast edge of transition between 1 and 0 in noise-sensitive system.

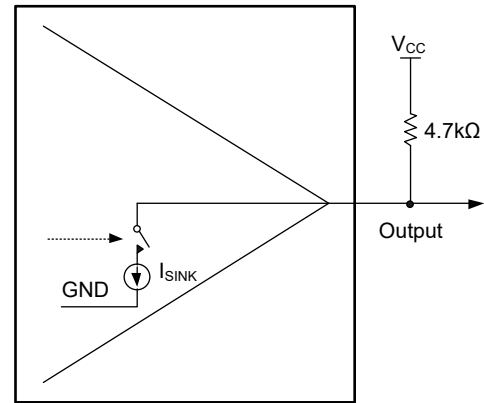


Figure 1. Open-Drain Output Structure

**APPLICATION INFORMATION**

**Application Circuits**

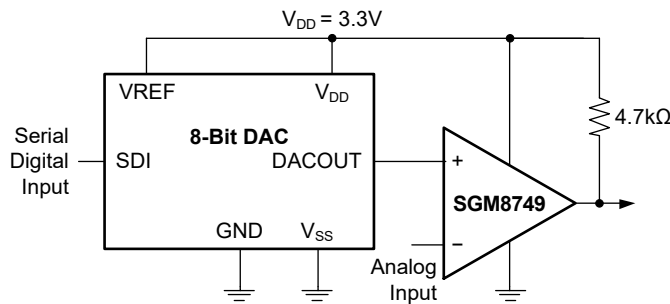


Figure 2. A Threshold Detector Controlled by 8-Bit DAC

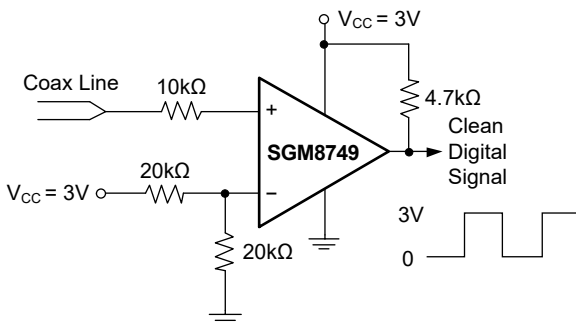


Figure 3. The Application of Line Receiver

**Layout and Bypassing**

Good power supply decoupling, layout and grounding are very important for SGM8749 to realize the full high-speed capabilities in system, following skills will be used:

- ◆ A 0.1μF to 4.7μF range ceramic capacitor is used to provide good power supply decoupling. This ceramic capacitor must be placed as close to  $V_{CC}$  pin as possible.
- ◆ For grounding, unbroken and low-inductance ground plane is a good choice.
- ◆ For Layout, use short PCB trace to avoid unwanted parasitic feedback around the comparator. SGM8749 must be soldered directly to the PCB and the socket is not recommended.

**REVISION HISTORY**

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

<b>AUGUST 2023 – REV.A.1 to REV.A.2</b>	<b>Page</b>
Updated Package Outline Dimensions section .....	9

---

<b>AUGUST 2021 – REV.A to REV.A.1</b>	<b>Page</b>
Updated General Description section.....	1
Updated Pin Configurations section .....	2
Updated Electrical Characteristics section .....	3
Updated Detailed Description section .....	6

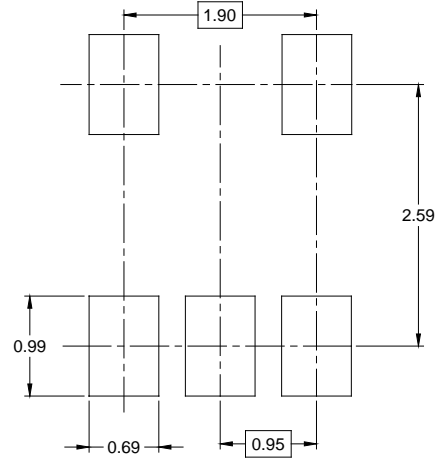
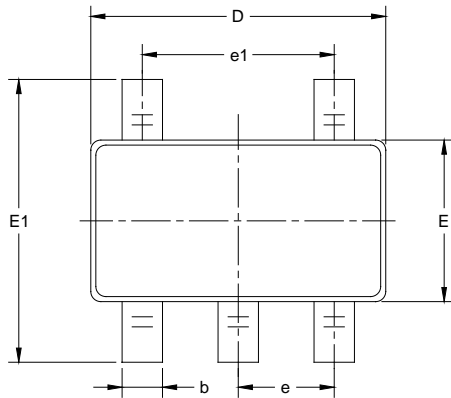
---

<b>Changes from Original (JUNE 2015) to REV.A</b>	
Changed from product preview to production data.....	All

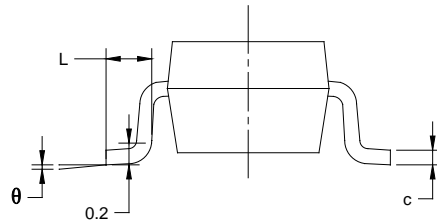
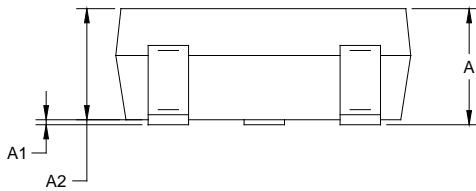
---

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°

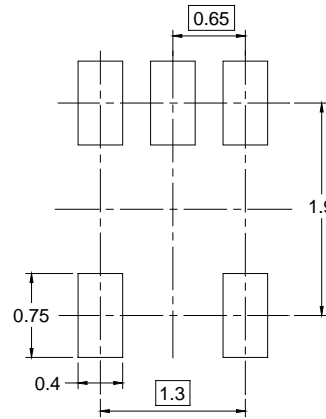
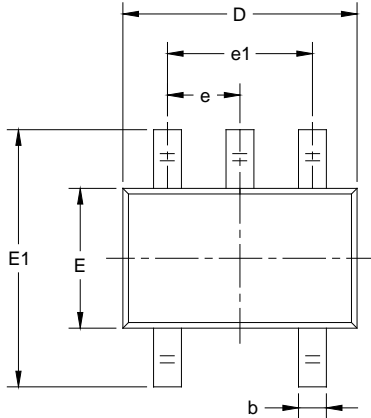
NOTES:

1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.

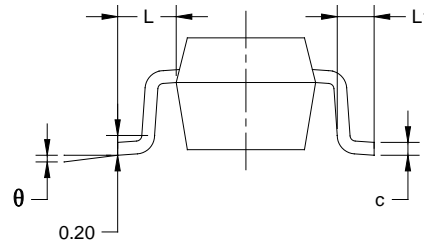
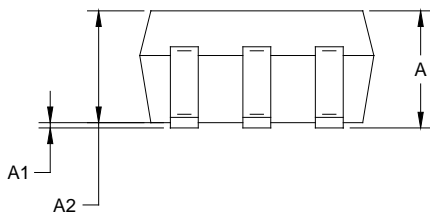


PACKAGE OUTLINE DIMENSIONS

SC70-5



RECOMMENDED LAND PATTERN (Unit: mm)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.800	1.100	0.031	0.043
A1	0.000	0.100	0.000	0.004
A2	0.800	1.000	0.031	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.220	0.003	0.009
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	1.300 BSC		0.051 BSC	
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

NOTES:

1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.

## 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
SC70-5	7"	9.5	2.40	2.50	1.20	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