

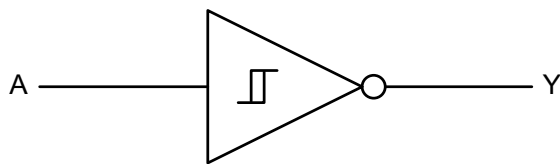
### GENERAL DESCRIPTION

The SGM7SZ14 is a single inverter with Schmitt trigger input through advanced CMOS technology. The supply voltage pin of this device accepts any voltage from 1.65V to 5.5V. The input can tolerate a maximum of 6V, regardless of the supply voltage range. When  $V_{CC}$  is at 0V, the input and output are in the high-impedance state.

This device can achieve ultra-high speed operation with high output drive, while the low static power dissipation over the wide supply voltage operating range is maintained.

The SGM7SZ14 is available in Green SOT-23-5 and SC70-5 packages. It operates over an ambient temperature range of  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .

### LOGIC SYMBOL



### FEATURES

- **Wide Supply Voltage Range: 1.65V to 5.5V**
- **Ultra-High Speed:  $t_{PD}$  of 4.2ns (TYP) into 50pF at  $V_{CC} = 3.3V$**
- **Support LCX Performance at  $V_{CC} = 3.3V$**
- **High Output Drive:  $\pm 24\text{mA}$  at  $V_{CC} = 3V$**
- **Input Over-Voltage Tolerance Makes 5V to 3V Translation Available**
- **Power Down High-Impedance Input/Output**
- **Available in Green SOT-23-5 and SC70-5 Packages**

### FUNCTION TABLE

INPUT	OUTPUT
A	Y
L	H
H	L

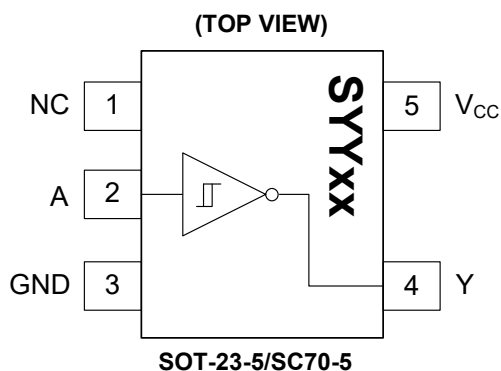
$$Y = \bar{A}$$

H = High Voltage Level

L = Low Voltage Level



PIN CONFIGURATIONS



PIN DESCRIPTION

PIN	NAME	FUNCTION
1	NC	No Connection.
2	A	Input. Unused input must be held high or low. It may not float.
3	GND	Ground.
4	Y	Output.
5	V <sub>CC</sub>	Power Supply.

**ELECTRICAL CHARACTERISTICS**(Full = -40°C to +125°C, typical values are at T<sub>A</sub> = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	V <sub>CC</sub> (V)	MIN	TYP	MAX	UNITS				
<b>General</b>											
Power Supply Range	V <sub>CC</sub>			1.65		5.50	V				
Supply Voltage Data Retention				1.50		5.50					
Input Voltage	V <sub>IN</sub>			0.00		5.50	V				
Output Voltage	V <sub>OUT</sub>			0.00		V <sub>CC</sub>	V				
<b>DC Performance</b>											
Positive Threshold Voltage	V <sub>P</sub>		1.65	0.70	0.96	1.20	V				
			1.80	0.75	1.04	1.30					
			2.30	1.00	1.30	1.55					
			3.00	1.35	1.65	1.95					
			4.50	2.05	2.40	2.70					
			5.50	2.60	2.92	3.25					
Negative Threshold Voltage	V <sub>N</sub>		1.65	0.35	0.53	0.70	V				
			1.80	0.40	0.57	0.75					
			2.30	0.60	0.77	0.95					
			3.00	0.85	1.04	1.20					
			4.50	1.35	1.56	1.75					
			5.50	1.65	1.90	2.10					
Hysteresis Voltage	V <sub>H</sub>		1.65	0.10	0.43	0.70	V				
			1.80	0.14	0.46	0.75					
			2.30	0.18	0.52	0.80					
			3.00	0.22	0.60	0.95					
			4.50	0.37	0.83	1.25					
			5.50	0.60	1.02	1.40					
High-Level Output Voltage	V <sub>OH</sub>	V <sub>IN</sub> = V <sub>IL</sub>	I <sub>OH</sub> = -100μA	1.65	1.62	1.65	V				
				1.80	1.77	1.80					
				2.30	2.27	2.30					
				3.00	2.97	3.00					
				4.50	4.47	4.50					
			I <sub>OH</sub> = -4mA	1.65	1.46	1.55					
			I <sub>OH</sub> = -8mA	2.30	2.01	2.18					
			I <sub>OH</sub> = -16mA	3.00	2.49	2.81					
			I <sub>OH</sub> = -24mA	3.00	2.30	2.70					
			I <sub>OH</sub> = -32mA	4.50	3.98	4.20					
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IH</sub>	I <sub>OL</sub> = 100μA	1.65		0.00	V				
				1.80		0.00					
				2.30		0.00					
				3.00		0.00					
				4.50		0.00					
			I <sub>OL</sub> = 4mA	1.65		0.06					
			I <sub>OL</sub> = 8mA	2.30		0.09					
			I <sub>OL</sub> = 16mA	3.00		0.16					
			I <sub>OL</sub> = 24mA	3.00		0.24					
			I <sub>OL</sub> = 32mA	4.50		0.29					
			Input Leakage Current	I <sub>IN</sub>	V <sub>IN</sub> = 5.5V, GND	0 to 5.5			±0.10	±5	μA
			Power-Off Leakage Current	I <sub>OFF</sub>	V <sub>IN</sub> or V <sub>OUT</sub> = 5.5V	0			0.10	5	μA
			Quiescent Supply Current	I <sub>CC</sub>	V <sub>IN</sub> = 5.5V, GND	1.65 to 5.5			0.10	10	μA

**ELECTRICAL CHARACTERISTICS (continued)**(Full = -40°C to +125°C, typical values are at T<sub>A</sub> = +25°C, unless otherwise noted.)

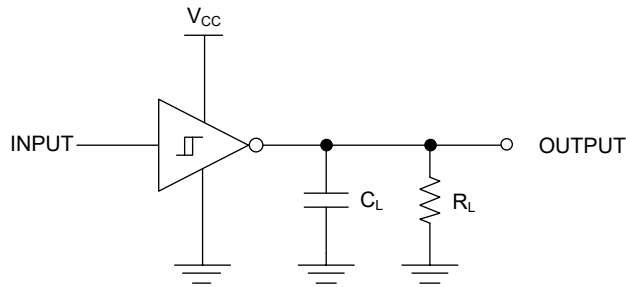
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
<b>AC Performance</b>						
Propagation Delay	t <sub>PHL</sub> , t <sub>PLH</sub>	V <sub>CC</sub> = 1.65V	C <sub>L</sub> = 15pF, R <sub>L</sub> = 1MΩ, Figure 1, Figure 2		9.3	ns
		V <sub>CC</sub> = 1.80V			7.6	
		V <sub>CC</sub> = 2.50V ± 0.20V			4.7	
		V <sub>CC</sub> = 3.30V ± 0.30V			3.6	
		V <sub>CC</sub> = 5.00V ± 0.50V			2.7	
		V <sub>CC</sub> = 3.30V ± 0.30V		C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω, Figure 1, Figure 2		
		V <sub>CC</sub> = 5.00V ± 0.50V			3.2	
Input Capacitance	C <sub>IN</sub>	V <sub>CC</sub> = 0V		4.0		pF
Power Dissipation Capacitance <sup>(2)</sup>	C <sub>PD</sub>	V <sub>CC</sub> = 3.30V	Figure 3		17.0	pF
		V <sub>CC</sub> = 5.00V			19.0	

## NOTES:

- Unused input must be held high or low. It may not float.
- C<sub>PD</sub> is defined as the internal equivalent capacitance value derived from dynamic operating current consumption (I<sub>CCD</sub>) at no output loading and operating at 50% duty cycle (see Figure 3). C<sub>PD</sub> derives from dynamic operating current I<sub>CCD</sub> by the expression:  

$$I_{CCD} = (C_{PD})(V_{CC})(f_{IN}) + (I_{CC, Static})$$

TEST CIRCUITS



NOTE:  
 $R_L$ : Load resistance.  
 $C_L$ : Load and stray capacitance.  
 Input PRR = 1.0MHz;  $t_w$  = 500ns.

Figure 1. AC Test Circuit

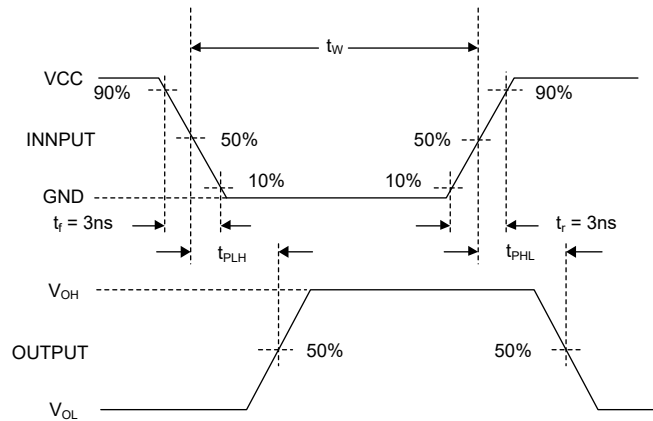


Figure 2. AC Waveforms

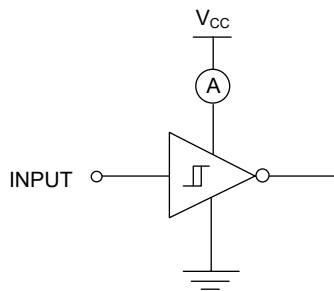


Figure 3.  $I_{CCD}$  Test Circuit

NOTE:  
 Input = AC Waveform;  $t_r = t_f = 1.8ns$ ; PRR = 10MHz; Duty Cycle = 50%.

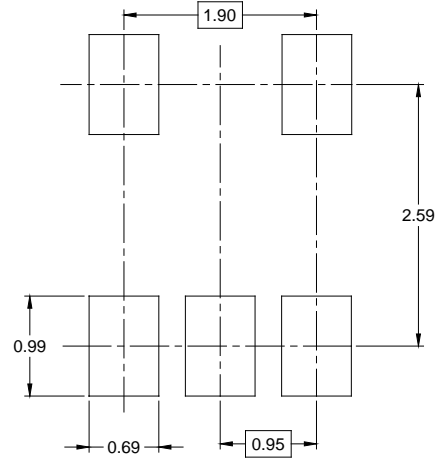
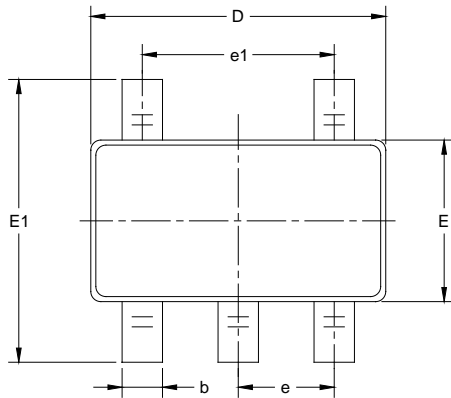
## REVISION HISTORY

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

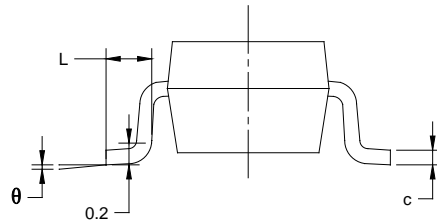
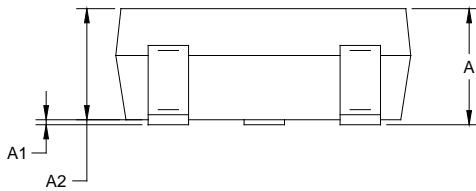
	<b>Page</b>
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<b>MAY 2022 – REV.A.2 to REV.A.3</b>	
Updated Absolute Maximum Ratings .....	2
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<b>SEPTEMBER 2021 – REV.A.1 to REV.A.2</b>	<b>Page</b>
Updated Package Outline Dimensions section .....	8
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<b>FEBRUARY 2021 – REV.A to REV.A.1</b>	<b>Page</b>
Changed operating temperature range .....	All
<hr/>	
<b>Changes from Original (OCTOBER 2013) to REV.A</b>	<b>Page</b>
Changed from product preview to production data.....	All
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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°

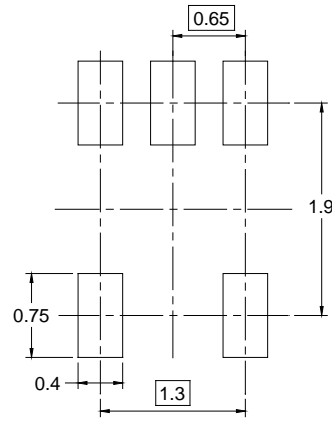
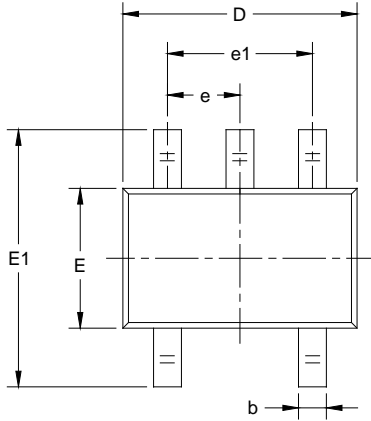
**NOTES:**

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

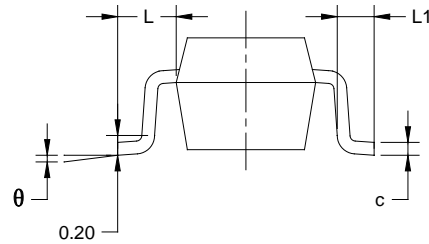
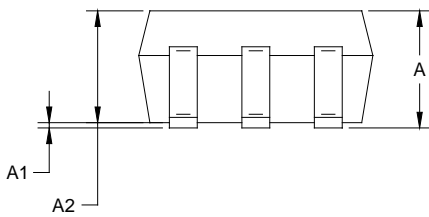


PACKAGE OUTLINE DIMENSIONS

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	2.25	2.55	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