

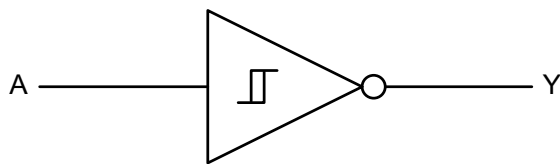
### GENERAL DESCRIPTION

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  $V_{CC} = 3.3\text{V}$**
- **Support LCX Performance at  $V_{CC} = 3.3\text{V}$**
- **High Output Drive:  $\pm 24\text{mA}$  at  $V_{CC} = 3\text{V}$**
- **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

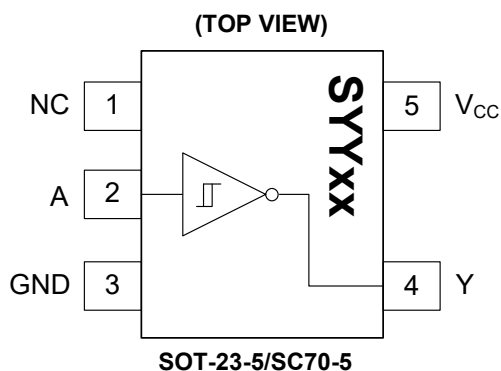
$$Y = \bar{A}$$

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

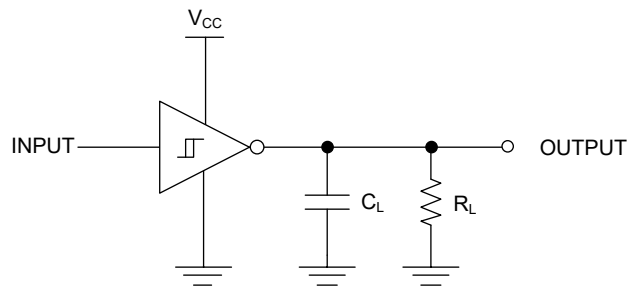
**ELECTRICAL CHARACTERISTICS (continued)**(Full = -40°C to +125°C, typical values are at T<sub>A</sub> = +25°C, unless otherwise noted.)

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<sub>CCD</sub> = (C<sub>PD</sub>) (V<sub>CC</sub>) (f<sub>IN</sub>) + (I<sub>CC, Static</sub>).

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

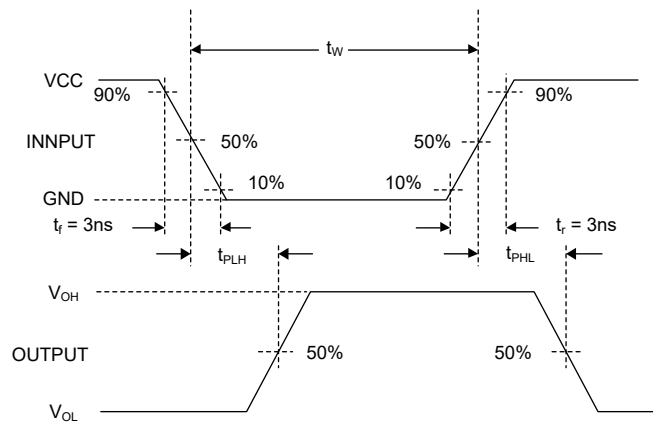


Figure 2. AC Waveforms

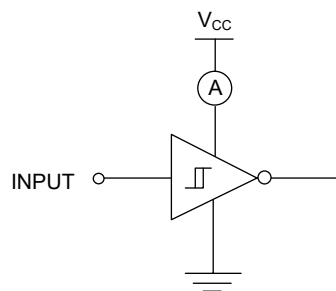


Figure 3.  $I_{CCD}$  Test Circuit

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

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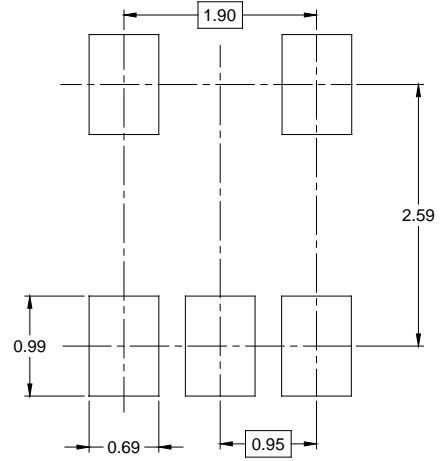
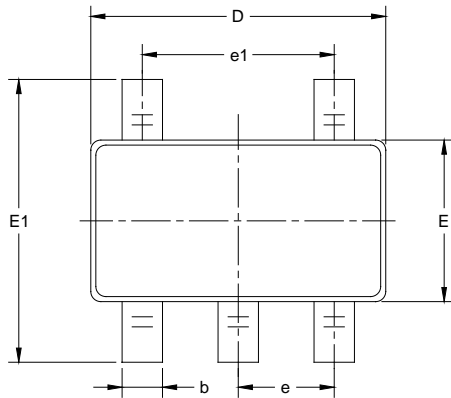
**REVISION HISTORY**

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

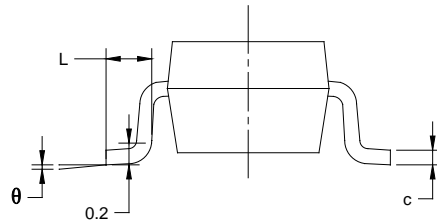
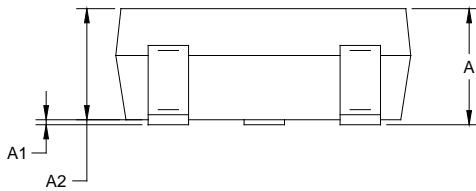
	<b>Page</b>
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Updated Absolute Maximum Ratings .....	2
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<b>FEBRUARY 2021 – REV.A to REV.A.1</b>	<b>Page</b>
Changed operating temperature range .....	All
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<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°

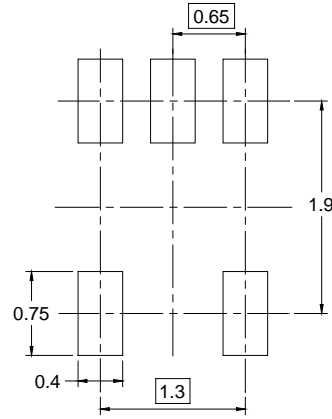
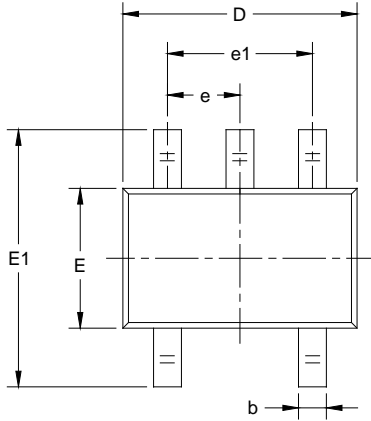
NOTES:

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

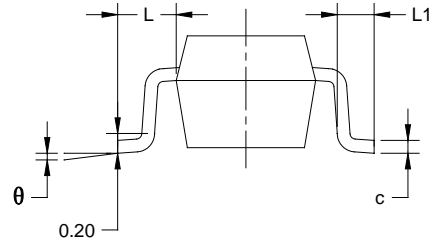
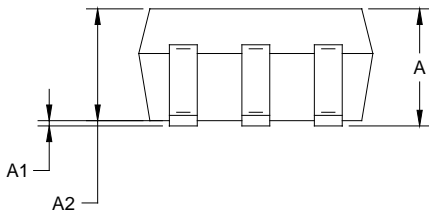


PACKAGE OUTLINE DIMENSIONS

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
$\theta$	0°	8°	0°	8°

NOTES:

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

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

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# 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