

# SGM7SZ14

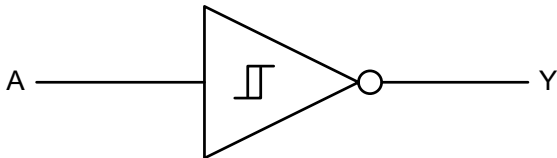
## Small Logic Inverter with Schmitt Trigger Input

### GENERAL DESCRIPTION

The SGM7SZ14 is a single inverter with Schmitt trigger input from SGMICRO's Small Logic series. The device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive while maintaining low static power dissipation over a broad  $V_{CC}$  operating range. The device is specified to operate over the 1.65V to 5.5V  $V_{CC}$  operating range. The input and output are high impedance when  $V_{CC}$  is 0V. The input tolerates voltages up to 6V, independent of  $V_{CC}$  operating voltage.

The SGM7SZ14 is available in Green SOT-23-5 and SC70-5 packages. It operates over an ambient temperature range of -40°C to +125°C.

### LOGIC SYMBOL



### FEATURES

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

### FUNCTION TABLE

INPUT	OUTPUT
A	Y
L	H
H	L

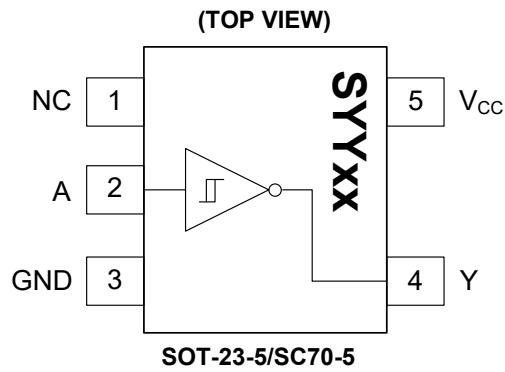
$$Y = \bar{A}$$

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	0.02	V			
				1.80		0.00	0.02				
				2.30		0.00	0.02				
				3.00		0.00	0.02				
				4.50		0.00	0.02				
			I <sub>OL</sub> = 4mA	1.65		0.06	0.12				
			I <sub>OL</sub> = 8mA	2.30		0.09	0.18				
			I <sub>OL</sub> = 16mA	3.00		0.16	0.33				
			I <sub>OL</sub> = 24mA	3.00		0.24	0.51				
			I <sub>OL</sub> = 32mA	4.50		0.29	0.58				
			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

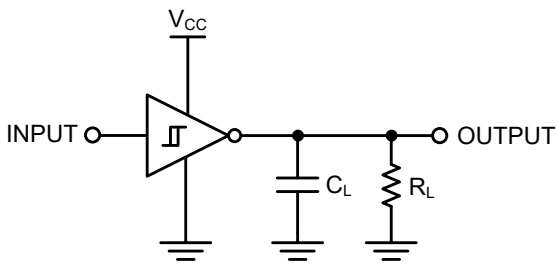
**ELECTRICAL CHARACTERISTICS (continued)**(Full = -40°C to +125°C, typical values are at  $T_A = +25^\circ\text{C}$ , unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
<b>AC Performance</b>						
Propagation Delay	$t_{\text{PHL}}, t_{\text{PLH}}$	$V_{\text{CC}} = 1.65\text{V}$		9.3		ns
		$V_{\text{CC}} = 1.80\text{V}$		7.6		
		$V_{\text{CC}} = 2.50\text{V} \pm 0.20\text{V}$		4.7		
		$V_{\text{CC}} = 3.30\text{V} \pm 0.30\text{V}$		3.6		
		$V_{\text{CC}} = 5.00\text{V} \pm 0.50\text{V}$		2.7		
		$V_{\text{CC}} = 3.30\text{V} \pm 0.30\text{V}$		4.2		
		$V_{\text{CC}} = 5.00\text{V} \pm 0.50\text{V}$		3.2		
Input Capacitance	$C_{\text{IN}}$	$V_{\text{CC}} = 0\text{V}$		4.0		pF
Power Dissipation Capacitance <sup>(2)</sup>	$C_{\text{PD}}$	$V_{\text{CC}} = 3.30\text{V}$	Figure 3	17.0		pF
		$V_{\text{CC}} = 5.00\text{V}$		19.0		

## NOTES:

- Unused input must be held high or low. It may not float.
- $C_{\text{PD}}$  is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption ( $I_{\text{CCD}}$ ) at no output loading and operating at 50% duty cycle (see Figure 3).  $C_{\text{PD}}$  is related to dynamic operating current  $I_{\text{CCD}}$  by the expression:  $I_{\text{CCD}} = (C_{\text{PD}})(V_{\text{CC}})(f_{\text{IN}}) + (I_{\text{CC,Static}})$ .

TEST CIRCUITS



$C_L$  includes load and stray capacitance;  
Input PRR = 1.0MHz;  $t_w$  = 500ns.

Figure 1. AC Test Circuit

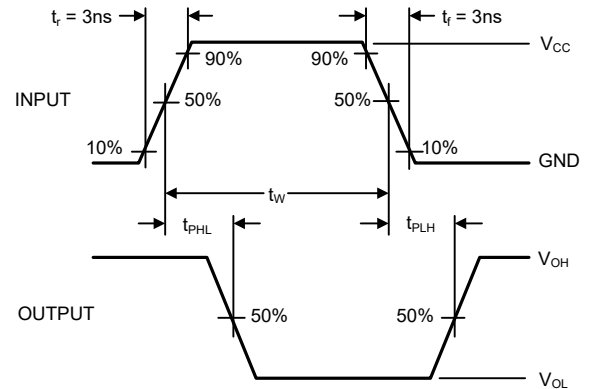
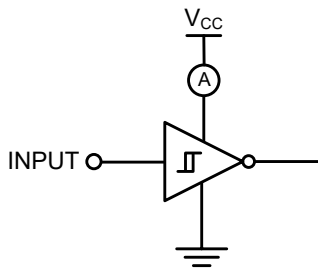


Figure 2. AC Waveforms



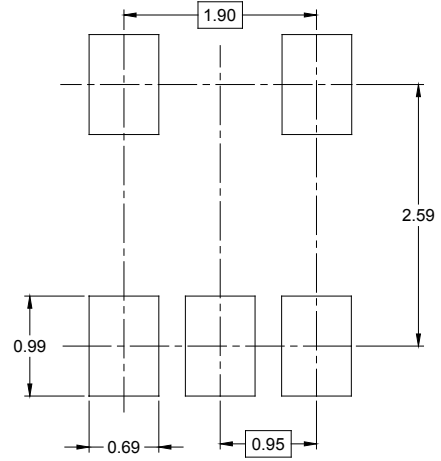
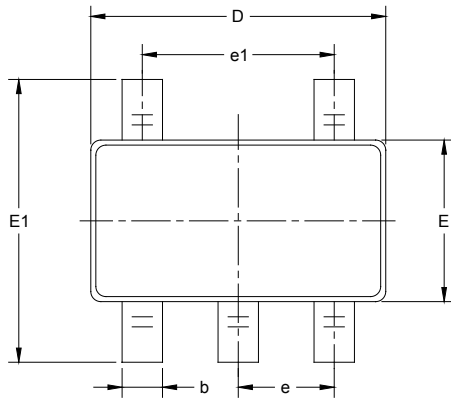
Input = AC Waveform;  $t_r = t_f = 1.8ns$ ;  
PRR = 10MHz; Duty Cycle = 50%.

Figure 3.  $I_{CCD}$  Test Circuit

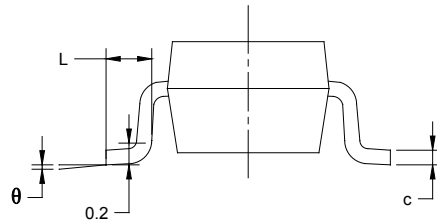
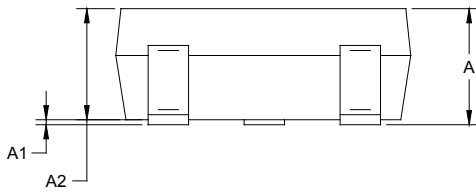
# PACKAGE INFORMATION

## PACKAGE OUTLINE DIMENSIONS

### SOT-23-5



RECOMMENDED LAND PATTERN (Unit: mm)

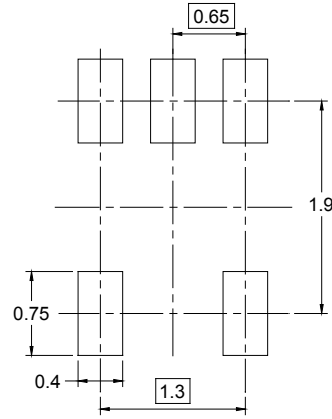
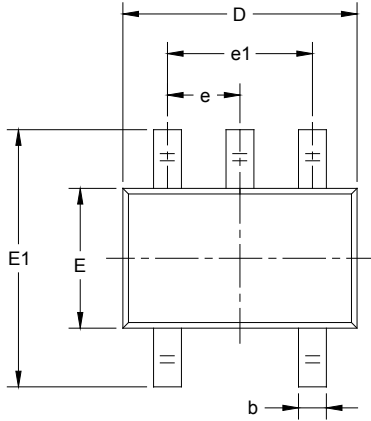


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037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

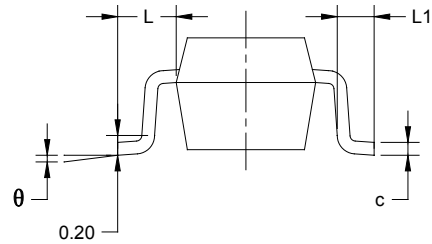
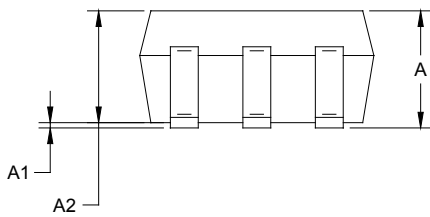
# PACKAGE INFORMATION

## PACKAGE OUTLINE DIMENSIONS

### SC70-5



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	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
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°



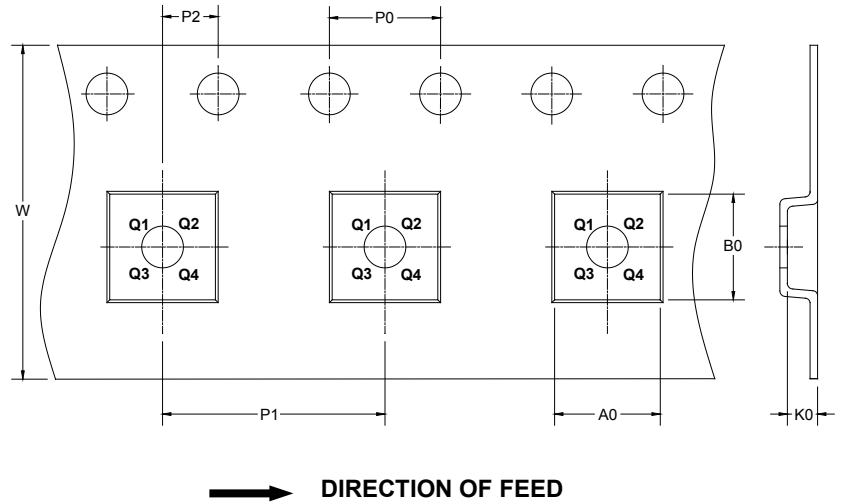
# PACKAGE INFORMATION

## 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
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