

### GENERAL DESCRIPTION

The 74LVC00A is a quad 2-input positive-NAND gate, which has a wide supply voltage ranging from 1.65V to 3.6V. The device implements the Boolean function  $Y = \overline{A \times B}$  or  $Y = \overline{A} + \overline{B}$ .

Both 3.3V and 5V devices can drive inputs, enabling this device to operate as translator in a mixed 3.3V and 5V system environment.

The 74LVC00A is available in Green SOIC-14 and TSSOP-14 packages. It operates over an ambient temperature range of -40°C to +125°C.

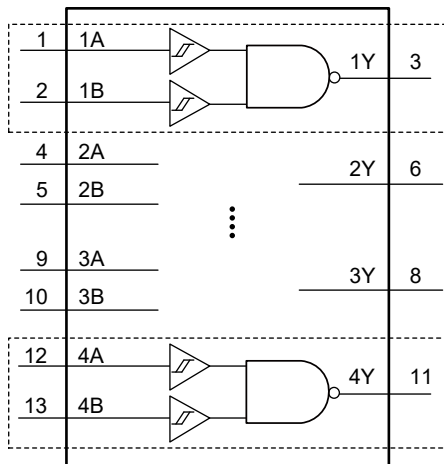
### FEATURES

- **Wide Supply Voltage Range: 1.65V to 3.6V**
- **Inputs Accept Voltages up to 5.5V**
- **Propagation Delay:  $t_{PD} = 3.6ns$  (TYP) at  $V_{CC} = 3.3V$**
- **-40°C to +125°C Operating Temperature Range**
- **Available in Green SOIC-14 and TSSOP-14 Packages**

### APPLICATIONS

- Industrial Equipment
- Computing: Server, PC and Notebook
- Medical Equipment
- Telecom Equipment

### LOGIC DIAGRAM



### FUNCTION TABLE

INPUT		OUTPUT
nA	nB	nY
H	H	L
L	X	H
X	L	H

$Y = \overline{A \times B}$  or  $Y = \overline{A} + \overline{B}$

H = High Voltage Level

L = Low Voltage Level

X = Don't Care

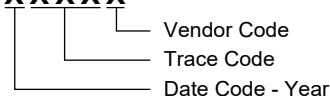
## PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
74LVC00A	SOIC-14	-40°C to +125°C	74LVC00AXS14G/TR	74LVC00AXS14 XXXXX	Tape and Reel, 2500
	TSSOP-14	-40°C to +125°C	74LVC00AXTS14G/TR	74LVC00A XTS14 XXXXX	Tape and Reel, 4000

## MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor Code.

**XXXXX**



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 <sup>(1)</sup>

Supply Voltage, $V_{CC}$ .....	-0.5V to 6.5V
Input Voltage, $V_I$ <sup>(2)</sup> .....	-0.5V to 6.5V
Output Voltage, $V_O$ <sup>(2)</sup> .....	-0.5V to MIN(6.5V, $V_{CC} + 0.5V$ )
Input Clamping Current, $I_{IK}$ ( $V_I < 0V$ ).....	-50mA
Output Clamping Current, $I_{OK}$ ( $V_O < 0V$ ).....	-50mA
Continuous Output Current.....	$\pm 50mA$
Continuous Current through GND.....	$\pm 100mA$
Junction Temperature <sup>(3)</sup> .....	+150°C
Storage Temperature Range.....	-65°C to +150°C
Lead Temperature (Soldering, 10s).....	+260°C
ESD Susceptibility	
HBM.....	6000V
CDM.....	1000V

## RECOMMENDED OPERATING CONDITIONS

Supply Voltage, $V_{CC}$ .....	1.65V to 3.6V
Input Voltage, $V_I$ .....	0V to 5.5V
Output Voltage, $V_O$ .....	0V to $V_{CC}$
High-Level Output Current, $I_{OH}$	
$V_{CC} = 1.65V$ .....	-4mA (MAX)
$V_{CC} = 2.3V$ .....	-8mA (MAX)
$V_{CC} = 2.7V$ .....	-12mA (MAX)
$V_{CC} = 3.0V$ .....	-24mA (MAX)
Low-Level Output Current, $I_{OL}$	
$V_{CC} = 1.65V$ .....	4mA (MAX)
$V_{CC} = 2.3V$ .....	8mA (MAX)
$V_{CC} = 2.7V$ .....	12mA (MAX)
$V_{CC} = 3.0V$ .....	24mA (MAX)
Operating 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.
- The input and output voltage ratings may be exceeded if the input and output clamp current ratings are observed.
- The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability.

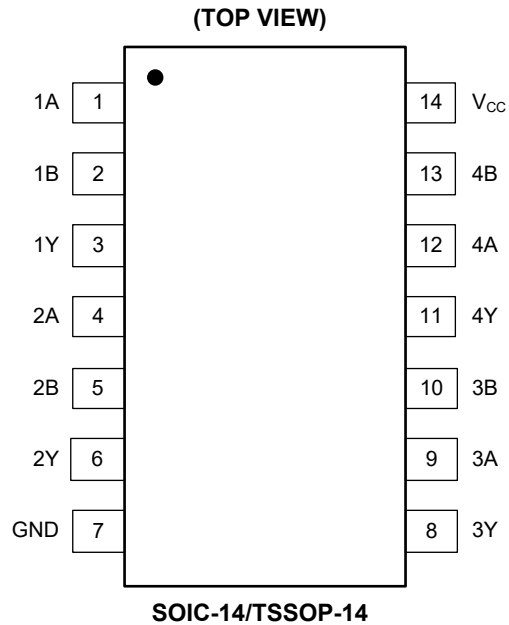
## ESD SENSITIVITY CAUTION

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



## PIN DESCRIPTION

PIN	NAME	FUNCTION
1, 4, 9, 12	1A, 2A, 3A, 4A	Data Inputs.
2, 5, 10, 13	1B, 2B, 3B, 4B	Data Inputs.
3, 6, 8, 11	1Y, 2Y, 3Y, 4Y	Data Outputs.
7	GND	Ground.
14	V <sub>CC</sub>	Supply Voltage.

**ELECTRICAL CHARACTERISTICS**(Full = -40°C to +125°C, all typical values are measured at  $V_{CC} = 3.3V$  and  $T_A = +25^\circ C$ , unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS	
High-Level Input Voltage	$V_{IH}$	$V_{CC} = 1.65V$ to $1.95V$	Full	$0.65 \times V_{CC}$			V	
		$V_{CC} = 2.3V$ to $2.7V$	Full	1.7				
		$V_{CC} = 2.7V$ to $3.6V$	Full	2.0				
Low-Level Input Voltage	$V_{IL}$	$V_{CC} = 1.65V$ to $1.95V$	Full			$0.35 \times V_{CC}$	V	
		$V_{CC} = 2.3V$ to $2.7V$	Full			0.7		
		$V_{CC} = 2.7V$ to $3.6V$	Full			0.8		
High-Level Output Voltage	$V_{OH}$	$V_I = V_{IH}$	$V_{CC} = 1.65V$ to $3.6V$ , $I_{OH} = -100\mu A$	Full	$V_{CC} - 0.05$	$V_{CC} - 0.01$	V	
			$V_{CC} = 1.65V$ , $I_{OH} = -4mA$	Full	1.45	1.58		
			$V_{CC} = 2.3V$ , $I_{OH} = -8mA$	Full	2.05	2.20		
			$V_{CC} = 2.7V$ , $I_{OH} = -12mA$	Full	2.35	2.57		
			$V_{CC} = 3.0V$ , $I_{OH} = -12mA$	Full	2.60	2.88		
			$V_{CC} = 3.0V$ , $I_{OH} = -24mA$	Full	2.45	2.77		
Low-Level Output Voltage	$V_{OL}$	$V_I = V_{IL}$	$V_{CC} = 1.65V$ to $3.6V$ , $I_{OL} = 100\mu A$	Full		0.005	0.05	V
			$V_{CC} = 1.65V$ , $I_{OL} = 4mA$	Full		0.05	0.20	
			$V_{CC} = 2.3V$ , $I_{OL} = 8mA$	Full		0.08	0.08	
			$V_{CC} = 2.7V$ , $I_{OL} = 12mA$	Full		0.11	0.11	
			$V_{CC} = 3.0V$ , $I_{OL} = 24mA$	Full		0.21	0.21	
Input Leakage Current	$I_I$	$V_{CC} = 3.6V$ , $V_I = 5.5V$ or GND	Full		0.10	5.0	$\mu A$	
Supply Current	$I_{CC}$	$V_{CC} = 3.6V$ , $V_I = V_{CC}$ or GND, $I_O = 0A$	Full		0.10	10.0	$\mu A$	
Additional Supply Current	$\Delta I_{CC}$	One input at $V_{CC} - 0.6V$ , other inputs at $V_{CC}$ or GND, $V_{CC} = 2.7V$ to $3.6V$	Full		0.10	500	$\mu A$	
Input Capacitance	$C_I$	$V_{CC} = 3.3V$ , $V_I = V_{CC}$ or GND	+25°C		4.60		pF	

**DYNAMIC CHARACTERISTICS**(See Figure 1 for test circuit. Full = -40°C to +125°C, all typical values are measured at T<sub>A</sub> = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN <sup>(1)</sup>	TYP	MAX <sup>(1)</sup>	UNITS	
Propagation Delay <sup>(2)</sup>	t <sub>PD</sub>	nA or nB to nY, see Figure 2	V <sub>CC</sub> = 1.65V to 1.95V	Full	0.3	7.6	15.0	ns
			V <sub>CC</sub> = 2.3V to 2.7V	Full	1.0	4.6	9.0	
			V <sub>CC</sub> = 2.7V	Full	1.0	4.1	8.0	
			V <sub>CC</sub> = 3.0V to 3.6V	Full	0.5	3.6	9.0	
Output Skew Time	t <sub>SK(O)</sub>	V <sub>CC</sub> = 3.0V to 3.6V	Full			3.0	ns	
Power Dissipation Capacitance <sup>(3)</sup>	C <sub>PD</sub>	f = 10MHz	V <sub>CC</sub> = 1.8V	+25°C		9.1	pF	
			V <sub>CC</sub> = 2.5V	+25°C		9.3		
			V <sub>CC</sub> = 3.3V	+25°C		9.6		

## NOTES:

- Specified by design and characterization, not production tested.
- t<sub>PD</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.
- C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$$

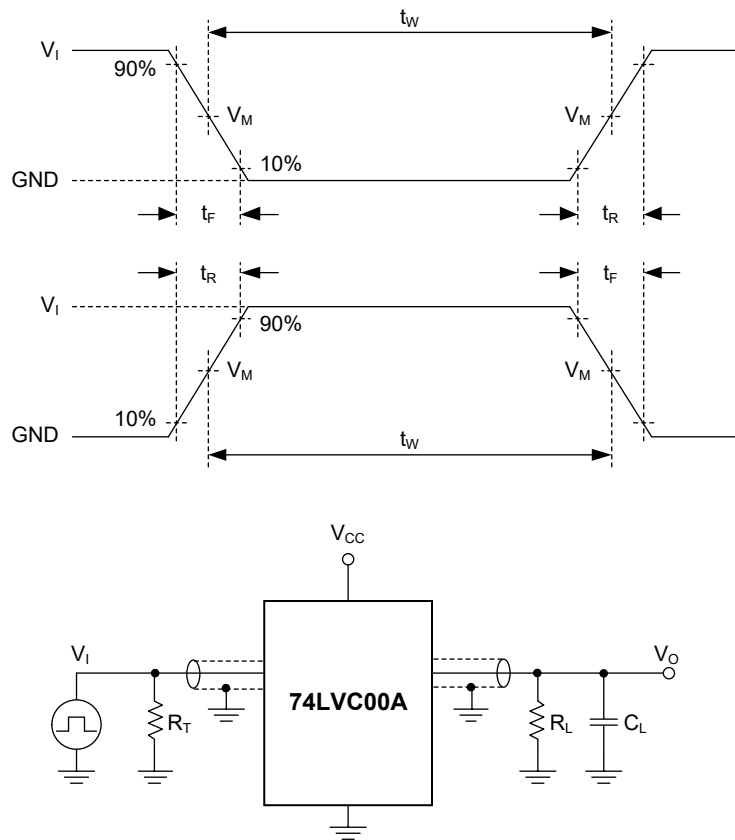
where:

f<sub>i</sub> = input frequency in MHz.f<sub>o</sub> = output frequency in MHz.C<sub>L</sub> = output load capacitance in pF.V<sub>CC</sub> = supply voltage in Volts.

N = number of inputs switching.

Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of the outputs.

## TEST CIRCUIT



Test conditions are given in Table 1.

Definitions for test circuit:

$R_L$ : Load resistance.

$C_L$ : Load capacitance (includes jig and probe).

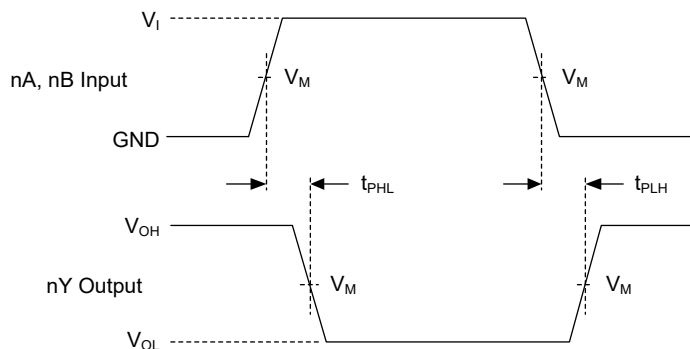
$R_T$ : Termination resistance (equals to output impedance  $Z_O$  of the pulse generator).

Figure 1. Test Circuit for Measuring Switching Times

Table 1. Test Conditions

SUPPLY VOLTAGE	INPUT		LOAD	
$V_{CC}$	$V_I$	$t_R, t_F$	$C_L$	$R_L$
1.65V to 1.95V	$V_{CC}$	$\leq 2.0\text{ns}$	30pF	1k $\Omega$
2.3V to 2.7V	$V_{CC}$	$\leq 2.0\text{ns}$	30pF	500 $\Omega$
2.7V	2.7V	$\leq 2.5\text{ns}$	50pF	500 $\Omega$
3.0V to 3.6V	2.7V	$\leq 2.5\text{ns}$	50pF	500 $\Omega$

## WAVEFORMS



Test conditions are given in Table 1.

Measurement points are given in Table 2.

Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

Figure 2. Input nA, nB to Output nY Propagation Delays

Table 2. Measurement Points

SUPPLY VOLTAGE	INPUT		OUTPUT
$V_{CC}$	$V_I$	$V_M^{(1)}$	$V_M$
1.65V to 1.95V	$V_{CC}$	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
2.3V to 2.7V	$V_{CC}$	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
2.7V	2.7V	1.5V	1.5V
3.0V to 3.6V	2.7V	1.5V	1.5V

NOTE:

1. The measurement points should be  $V_{IH}$  or  $V_{IL}$  when the input rising or falling time exceeds 2.5ns.

## REVISION HISTORY

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

## MAY 2024 – REV.A to REV.A.1

Updated LOGIC DIAGRAM ..... 1

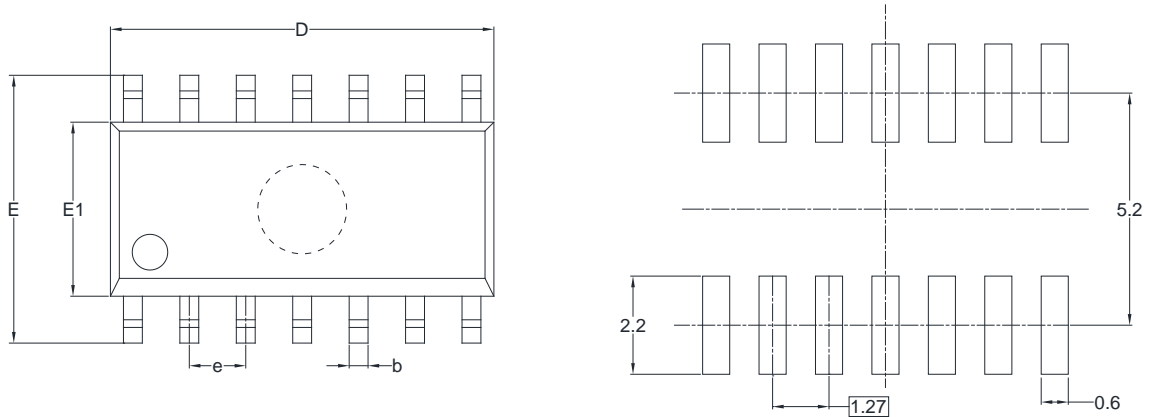
## Changes from Original (AUGUST 2023) to REV.A

Page

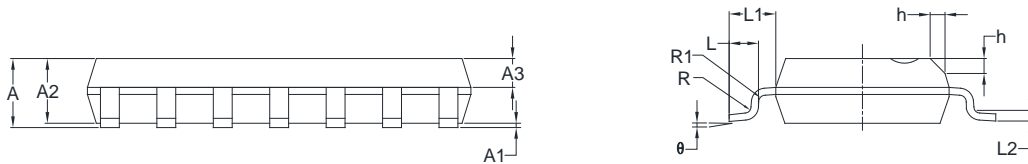
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PACKAGE OUTLINE DIMENSIONS

SOIC-14



RECOMMENDED LAND PATTERN (Unit: mm)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
A2	1.25	1.65	0.049	0.065
A3	0.55	0.75	0.022	0.030
b	0.36	0.49	0.014	0.019
D	8.53	8.73	0.336	0.344
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
L	0.45	0.80	0.018	0.032
L1	1.04 REF		0.040 REF	
L2	0.25 BSC		0.01 BSC	
R	0.07		0.003	
R1	0.07		0.003	
h	0.30	0.50	0.012	0.020
θ	0°	8°	0°	8°

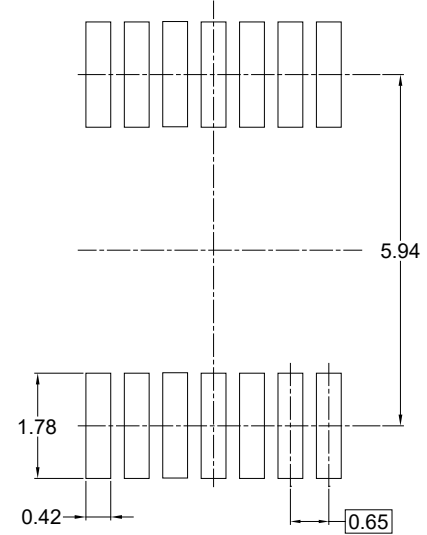
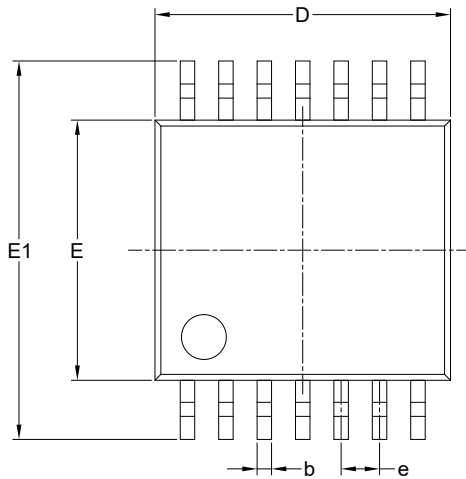
NOTES:

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

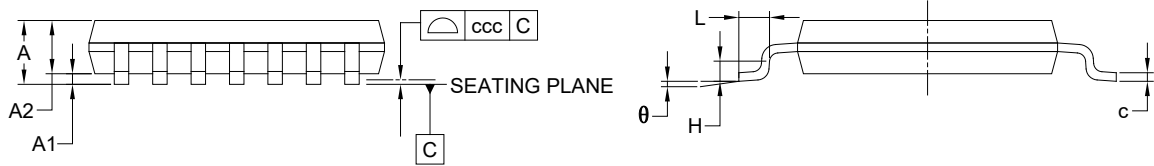


PACKAGE OUTLINE DIMENSIONS

TSSOP-14



RECOMMENDED LAND PATTERN (Unit: mm)



Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	-	-	1.200
A1	0.050	-	0.150
A2	0.800	-	1.050
b	0.190	-	0.300
c	0.090	-	0.200
D	4.860	-	5.100
E	4.300	-	4.500
E1	6.200	-	6.600
e	0.650 BSC		
L	0.450	-	0.750
H	0.250 TYP		
θ	0°	-	8°
ccc	0.100		

NOTES:

1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MO-153.

## 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
SOIC-14	13"	16.4	6.60	9.30	2.10	4.0	8.0	2.0	16.0	Q1
TSSOP-14	13"	12.4	6.80	5.40	1.50	4.0	8.0	2.0	12.0	Q1

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
13"	386	280	370	5

DD0002