



QUADRUPLE 2-INPUT NAND GATES

Description

The 74LV00A provides provides four independent 2-input NAND gates with standard push-pull outputs. The device is designed for operation with a power supply range of 2.0V to 5.5V.

The inputs are tolerant to 5.5V allowing this device to be used in a mixed voltage environment. The device is fully specified for partial power down applications using I_{OFF} . The I_{OFF} circuitry disables the output preventing damaging current backflow when the device is powered down.

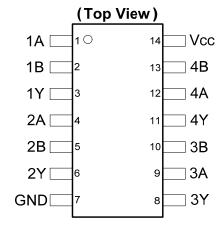
The gates perform the Boolean function:

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

Features

- Wide Supply Voltage Range from 2.0V to 5.5V
- Sinks or sources 12mA at V_{CC} = 4.5V
- CMOS low power consumption
- I_{OFF} Supports Partial -Power Down Operation
- Inputs or Outputs accept up to 5.5V
- Inputs can be driven by 3.3V or 5V allowing for voltage translation applications.
- Schmitt Trigger Action at All Inputs
- ESD Protection Tested per JESD 22
 - Exceeds 200-V Machine Model (A115)
 - Exceeds 2000-V Human Body Model (A114)
 - Exceeds 1000-V Charged Device Model (C101)
- Latch-Up Exceeds 100mA per JESD 78, Class I
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)

Pin Assignments



SO-14 / TSSOP-14

Applications

- General Purpose Logic
- Power Down Signal Isolation
- Wide array of products such as:
 - PCs, networking, notebooks, ultrabooks, netbooks
 - Computer peripherals, hard drives, CD/DVD ROM
 - TV, DVD, DVR, set top box

Notes:

- 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
- 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

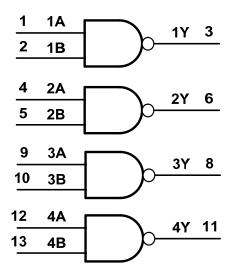
Click for Ordering Information



Pin Descriptions

Pin Number	Pin Name	Description
1	1A	Data Input
2	1B	Data Input
3	1Y	Data Output
4	2A	Data Input
5	2B	Data Input
6	2Y	Data Output
7	GND	Ground
8	3Y	Data Output
9	3A	Data Input
10	3B	Data Input
11	4Y	Data Output
12	4A	Data Input
13	4B	Data Input
14	Vcc	Supply Voltage

Logic Diagram



Function Table

Inp	uts	Output
Α	В	Υ
Н	Н	L
L	Х	Н
Х	L	Н

Absolute Maximum Ratings (Note 4) (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	kV
ESD CDM	Charged Device Model ESD Protection	1	kV
ESD MM	Machine Model ESD Protection	200	V
Vcc	Supply Voltage Range	-0.5 to +7.0	V
VI	Input Voltage Range note 4	-0.5 to +7.0	V
I _{IK}	Input Clamp Current V _I < 0V	-20	mA
lok	Output Clamp Current Vo < -0V	-50	mA
lo	Continuous Output Current - 0.5V < V _O V _{CC} +0.5V	±25	mA
Icc	Continuous Current Through V _{CC}	50	mA
I _{GND}	Continuous Current Through GND	-50	mA
TJ	Operating Junction Temperature	-40 to +150	°C
T _{STG}	Storage Temperature	-65 to +150	°C
Ртот	Total Power Dissipation	500	mW

Note: 4. Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.



Recommended Operating Conditions (Note 5) (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Max	Unit
Vcc	Supply Voltage		2.0	5.5	V
VI	Input Voltage		0	5.5	V
Vo	Output Voltage		0	V _{CC}	V
		2.0V	_	-50	mA
	High Loyal Output Current	2.3V to 2.7V	_	-2	μA
Іон	High-Level Output Current	3.0V to 3.6V	_	-6	mA
		4.5V to 5.5V	_	-12	mA
		2.0V	_	50	μA
	Low Lovel Output Current	2.3V to 2.7V	_	2	mA
l _{OL}	Low-Level Output Current	3.0V to 3.6V	_	6	mA
		4.5V to 5.5V	_	12	mA
		2.3V to 2.7V	_	200	
Δt/ΔV	Input Transition Rise or Fall Rate	3.0V to 3.6V	_	100	ns/V
	Tale	4.5V to 5.5V	_	20	1
T _A	Operating Free-Air Temperature	_	-40	+125	°C

Note:

5. Unused inputs should be held at V_{CC} or Ground.

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Cumbal	Doromotor	Took Conditions	V	T _A = -40°0	C to +85°C	T _A = -40°C	to +125°C	11
Symbol	Parameter	Test Conditions	V _{CC}	Min	Max	Min	Max	Unit
		_	2.0V	1.5	_	1.5	_	
.,	High-Level Input	_	2.3V to 2.7V	V _{CC} X 0.7	_	V _{CC} X 0.7	_	V
V _{IH}	Voltage	_	3.0V to 3.6V	V _{CC} X 0.7	_	V _{CC} X 0.7	_	
		_	4.5V to 5.5V	V _{CC} X 0.7	_	V _{CC} X 0.7	_	_
		_	2.0V	_	0.5	_	0.5	
.,	Low-Level Input	_	2.3V to 2.7V	_	V _{CC} X 0.3	_	V _{CC} X 0.3	V
VIL	Voltage	_	3.0V to 3.6V	_	V _{CC} X 0.3	_	V _{CC} X 0.3	
		_	4.5V to 5.5V	_	V _{CC} X 0.3	_	V _{CC} X 0.3	-
		I _{OH} = -50μA	2.0V to 5.5V	V _{CC} -0.1	_	V _{CC} -0.1	_	
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	High-Level	I _{OH} = -2mA	2.3V	2.0	_	2.0	_	V
V _{OH}	Output Voltage	I _{OH} = -6mA	3.0V	2.48	_	2.48	_	V
		I _{OH} = -12mA	4.5V	3.8	_	3.8	_	
		I _{OL} = 50μA	2.0V to 5.5V	_	0.1	_	0.1	
.,	Low-Level	I _{OL} = 2mA	2.3V	_	0.4	_	0.4	V
V_{OL}	Output Voltage	I _{OL} = 6mA	3.0V	_	0.44	_	0.44	V
		I _{OL} = 12mA	4.5V	_	0.55	_	0.55	
I _{OFF}	Power Down Leakage Current	V_I or $V_O = 0$ to 5.5V	0V	_	5	_	5	μΑ
II	Input Current	V _I = GND or 5.5V	0 to 5.5V	_	±1	_	±1	μΑ
Icc	Supply Current	$V_1 = GND \text{ or } V_{CC}$ $I_0 = 0$	5.5V	_	20	_	20	μΑ



Switching Characteristics

Symbol	Parameter	Test	V	-	Γ _A = +25°0	;	-40°C to	+85°C	-40°C to	+125°C	Unit
Symbol	Farameter	Conditions	V _{CC}	Min	Тур	Max	Min	Max	Min	Max	
		Figure 1	2.5V ± 0.2V	_	7.1	12.9	1	15	1	16	
		Figure 1 $C_L = 15pF$	$3.3V \pm 0.3V$	_	5	7.9	1	9.5	1	10.5	ns
	Propagation CL = 13pF	CL = 15pi	5.0V ± 0.5V	_	3.6	5.5	1	6.5	1	7.5	
t _{PD}	Delay A _N to Y _N	Ciguro 1	2.5V ± 0.2V	_	9.6	16.6	1	20	1	21	
	Figure 1	$3.3V \pm 0.3V$	_	6.9	11.4	1	13	1	14	ns	
		$C_L = 50pF$	5.0V ± 0.5V	_	4.9	7.5	1	8.5	1	9.5	

Operating Characteristics

 $T_A = +25^{\circ}C$

	Parameter	Test Conditions	V _{cc}	Тур	Unit
_	Power Dissipation	F = 10 MHz	3.3V	9.5	~F
C _{pd}	Capacitance per Gate	$C_L = 50pF$	5.0V	11	pF

Noise Characteristics

V_{CC} = 3V, C_L = 50pF, T_A = +25°C

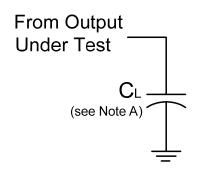
Symbol	Parameter	Min	Тур	Max	Unit
$V_{OL(p)}$	Quiet output, maximum dynamic V _{OL}	_	0.2	0.8	V
$V_{OL(V)}$	Quiet output, minimum dynamic V _{OL}	_	-0.1	-0.8	V
V _{OH(V)}	Quiet output, minimum dynamic V _{OH}	_	3.1	_	V
V _{IH(D)}	High Level dynamic input voltage	2.31	_	_	V
V _{IL(D)}	Low Level dynamic input voltage	_	_	0.99	V

Package Characteristics

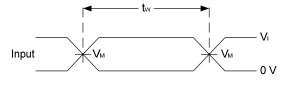
Symbol	Parameter	Test Conditions	V _{CC}	Min	Тур	Max	Unit
Ci	Input Capacitance	$V_i = V_{CC} - \text{ or GND}$	2.0 to 5.5V	_	3.3	10	pF



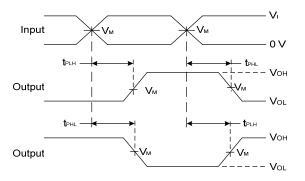
Parameter Measurement Information



V	Inp	outs			
V _{CC}	VI	t _r /t _f	V _M	CL	
2.0V to 5.5V	V _{CC}	<3ns	V _{CC} /2	15pF or 50pF	



Voltage Waveform Pulse Duration



Voltage Waveform Propagation Delay Times Inverting and Non Inverting Outputs

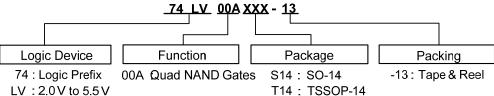
Notes: A. Includes test lead and test apparatus capacitance.

- B. All pulses are supplied at pulse repetition rate ≤ 10MHz
- C. Inputs are measured separately one transition per measurement
- D. t_{PLH} and t_{PHL} are the same as t_{PD}

Figure 1 Load Circuit and Voltage Waveforms



Ordering Information



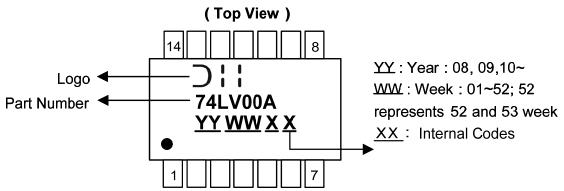
LV:2.0V to 5.5V T14:TSSOP-1² Family

Device	Package Code	Packaging	13" Tap	e and Reel
Device	Package Code	(Note 6)	Quantity	Part Number Suffix
74LV00AS14-13	S14	SO-14	2500/Tape & Reel	-13
74LV00AT14-13	T14	TSSOP-14	2500/Tape & Reel	-13

Note: 6. The taping orientation and tape details can be found at http://www.diodes.com/datasheets/ap02007.pdf

Marking Information

(1) SO14, TSSOP14



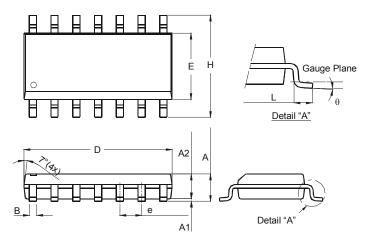
Part Number	Package
74LV00AS14	SO-14
74LV00AT14	TSSOP-14



Package Outline Dimensions (All Dimensions in mm)

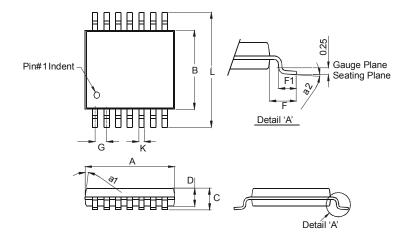
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

Package Type: SO-14



SO-14		
Dim	Min	Max
Α	1.47	1.73
A1	0.10	0.25
A2	1.45 Typ	
В	0.33	0.51
D	8.53	8.74
E	3.80	3.99
е	1.27 Typ	
Н	5.80	6.20
L	0.38	1.27
θ	0°	8°
All Dimensions in mm		

Package Type: TSSOP-14



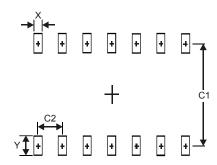
TSSOP-14		
Dim	Min	Max
a1	7° (4X)	
a2	0°	8°
Α	4.9	5.10
В	4.30	4.50
С	_	1.2
D	8.0	1.05
F	1.00 Typ	
F1	0.45	0.75
G	0.65 Typ	
K	0.19	0.30
L	6.40 Typ	
All Dimensions in mm		



Suggested Pad Layout

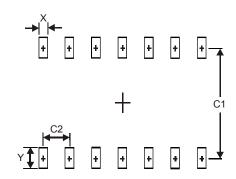
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

Package Type: SO-14



Dimensions	Value (in mm)
Х	0.60
Υ	1.50
C1	5.4
C2	1.27

Package Type: TSSOP-14



Dimensions	Value (in mm)	
Х	0.45	
Y	1.45	
C1	5.9	
C2	0.65	



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