74LVC1G00

SINGLE 2 INPUT POSITIVE NAND GATE

NEW PRODUCT

Description

The 74LVC1G00 is a single 2-input positive NAND gate with a standard push-pull output. The device is designed for operation with a power supply range of 1.65V 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.

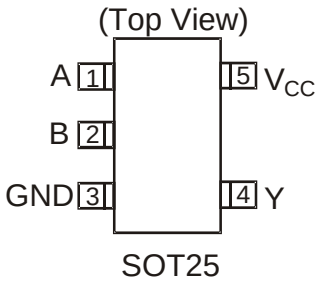
The gate performs the positive Boolean function:

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

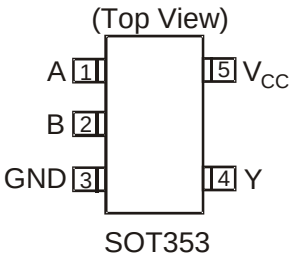
Features

- Wide Supply Voltage Range from 1.65 to 5.5V
- ± 24mA Output Drive at 3.3V
- CMOS low power consumption
- I_{OFF} Supports Partial-Power-Down Mode Operation
- Inputs accept up to 5.5V
- ESD Protection Tested per JESD 22
  - Exceeds 200-V Machine Model (A115-A)
  - Exceeds 2000-V Human Body Model (A114-A)
  - Exceeds 1000-V Charged Device Model (C101C)
- Latch-Up Exceeds 100mA per JESD 78, Class II
- Range of Package Options
- Direct Interface with TTL Levels
- All packages Assembled with “Green” Molding Compound (no Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 1)

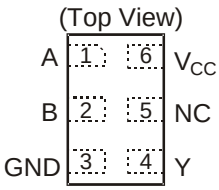
Pin Assignments



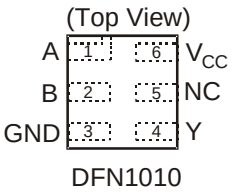
SOT25



SOT353



DFN1410



DFN1010

Applications

- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- Wide array of products such as.
  - PCs, networking, notebooks, netbooks, PDAs
  - Tablet Computers, E-readers
  - Computer peripherals, hard drives, CD/DVD ROM
  - TV, DVD, DVR, set top box
  - Cell Phones, Personal Navigation / GPS
  - MP3 players ,Cameras, Video Recorders

Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html

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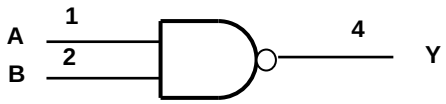
Pin Descriptions

Pin Name	Description
A	Data Input
B	Data Input
GND	Ground
Y	Data Output
V_{CC}	Supply Voltage
NC	No Connection

Logic Diagram



Function Table

Inputs		Output
A	B	Y
H	H	L
L	X	H
X	L	H

Absolute Maximum Ratings (Note 2)

Symbol	Description	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
V_{CC}	Supply Voltage Range	-0.5 to 6.5	V
V_I	Input Voltage Range	-0.5 to 6.5	V
V_O	Voltage applied to output in high impedance or I_{OFF} state	-0.5 to 6.5	V
V_O	Voltage applied to output in high or low state	-0.3 to V_{CC} +0.5	V
I_{IK}	Input Clamp Current V_I<0	-50	mA
I_{OK}	Output Clamp Current	-50	mA
I_O	Continuous output current	±50	mA
I_{CC}, I_{GND}	Continuous current through V_{CC} or GND	±100	mA
T_J	Operating Junction Temperature	-40 to 150	°C
T_{STG}	Storage Temperature	-65 to 150	°C

Notes: 2. 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.

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Recommended Operating Conditions (Note 3)

Symbol	Parameter		Min	Max	Unit
V_{CC}	Operating Voltage	Operating	1.65	5.5	V
		Data retention only	1.5		V
V_{IH}	High-level Input Voltage	V_{CC} = 1.65V to 1.95V	0.65 X V_{CC}		V
		V_{CC} = 2.3V to 2.7V	1.7		
		V_{CC} = 3V to 3.6V	2		
		V_{CC} = 4.5V to 5.5V	0.7 X V_{CC}		
V_{IL}	Low-level input voltage	V_{CC} = 1.65V to 1.95V		0.35 X V_{CC}	V
		V_{CC} = 2.3V to 2.7V		0.7	
		V_{CC} = 3V to 3.6V		0.8	
		V_{CC} = 4.5V to 5.5V		0.3 X V_{CC}	
V_I	Input Voltage		0	5.5	V
V_O	Output Voltage		0	V_{CC}	V
I_{OH}	High-level output current	V_{CC} = 1.65V		-4	mA
		V_{CC} = 2.3V		-8	
		V_{CC} = 3V		-16	
				-24	
		V_{CC} = 4.5V		-32	
I_{OL}	Low-level output current	V_{CC} = 1.65V		4	mA
		V_{CC} = 2.3V		8	
		V_{CC} = 3V		16	
				24	
		V_{CC} = 4.5V		32	
$\Delta t/\Delta V$	Input transition rise or fall rate	V_{CC} = 1.8V ± 0.15V, 2.5V ± 0.2V		20	ns/V
		V_{CC} = 3.3V ± 0.3V		10	
		V_{CC} = 5V ± 0.5V		5	
T_A	Operating free-air temperature		-40	125	ºC

Notes: 3. Unused inputs should be held at V_{CC} or Ground.

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Electrical Characteristics (All typical values are at V_{CC} = 3.3V, T_A = 25°C)

Symbol	Parameter	Test Conditions	Vcc	-40ºC to 85ºC			-40ºC to 125ºC		Unit
				Min	Typ.	Max	Min	Max	
V_{OH}	High Level Output Voltage	I_{OH} = -100µA	1.65V to 5.5V	V_{CC} – 0.1			V_{CC} – 0.1		V
		I_{OH} = -4mA	1.65V	1.2			0.95		
		I_{OH} = -8mA	2.3V	1.9			1.7		
		I_{OH} = -16mA	3V	2.4			2.2		
		I_{OH} = -24mA		2.3			2.0		
		I_{OH} = -32mA	4.5V	3.8			3.4		
V_{OL}	Low Level Output Voltage	I_{OL} = 100µA	1.65V to 5.5V			0.1		0.1	V
		I_{OL} = 4mA	1.65V			0.45		0.7	
		I_{OL} = 8mA	2.3V			0.3		0.45	
		I_{OL} = 16mA	3V			0.4		0.6	
		I_{OL} = 24mA				0.55		0.8	
		I_{OL} = 32mA	4.5V			0.55		.8	
I_I	Input Current	V_I = 5.5V or GND	0 to 5.5V		± 0.1	±5		± 100	µA
I_{OFF}	Power Down Leakage Current	V_I or V_O = 5.5V	0V			±10		±200	µA
I_{CC}	Supply Current	V_I = 5.5V or GND I_O=0	5.5V		0.1	10		200	µA
ΔI_{CC}	Additional Supply Current	One input at V_{CC} – 0.6V Other inputs at V_{CC} or GND	3V to 5.5V			500		5000	µA
C_i	Input Capacitance	V_i = V_{CC} – or GND	3.3V		5				pF

Package Characteristics (All typical values are at V_{CC} = 3.3V, T_A = 25°C)

Symbol	Parameter	Test Conditions	V_{CC}	Min	Typ.	Max	Unit
θ_{JA}	Thermal Resistance Junction-to-Ambient	SOT25	(Note 4)		204		°C/W
		SOT353			371		
		DFN1010			445		
		DFN1410			460		
θ_{JC}	Thermal Resistance Junction-to-Case	SOT25	(Note 4)		52		°C/W
		SOT35			143		
		DFN1010			250		
		DFN1410			265		

Notes: 4. Test condition for SOT25, SOT353, DFN1410 and DFN1010: Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

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Switching Characteristics

Figure 1 Typical Values at T_A = 25 ºC and nominal voltages 1.8V, 2.5V, 2.7V, 3.3V, and 5.0V.

Parameter	From Input	To Output	V_{CC}	T_A = -40ºC to 85ºC			T_A = -40ºC to 125ºC		Unit
				Min	Typ	Max	Min	Max	
t_{pd}	A or B	Y	1.8V ± 0.15V	1.0	3.3	8.0	1.0	10.5	ns
			2.5V ± 0.2V	0.5	2.2	5.5	0.5	7.0	
			2.7V	0.5	2.6	5.8	0.5	7.5	
			3.3V ± 0.3V	0.5	2.2	4.7	0.5	6.0	
			5.0V ± 0.5V	0.5	1.8	4.0	0.5	5.5	

Operating Characteristics

T_A = 25 ºC

Parameter		Test Conditions	V_{CC} = 1.8V	V_{CC} = 2.5V	V_{CC} = 3.3V	V_{CC} = 5V	Unit
			Typ.	Typ.	Typ.	Typ.	
C_{pd}	Power dissipation capacitance	f = 10 MHz	22	22	23	25	pF

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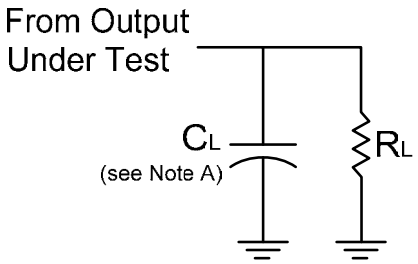
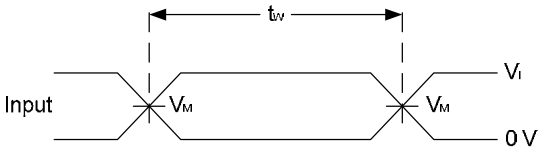
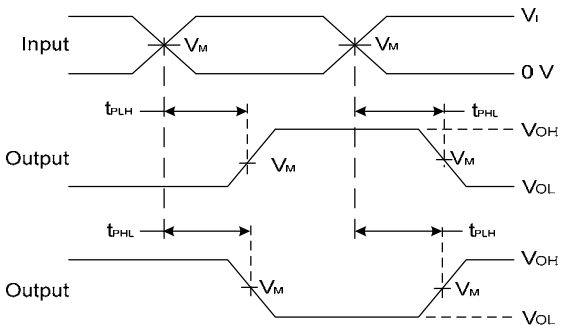
Parameter Measurement Information



V_{CC}	Inputs		V_M	C_L	R_L
	V_I	t_r/t_f			
1.8V ± 0.15V	V_{CC}	≤2ns	$V_{CC}/2$	30 pF	1 KΩ
2.5V ± 0.2V	V_{CC}	≤2ns	$V_{CC}/2$	30 pF	500 Ω
2.7V	V_{CC}	≤2.5ns	1.5V	50 pF	500 Ω
3.3V ± 0.3V	3.0V	≤2.5ns	1.5V	50 pF	500 Ω
5.0V ± 0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	50 pF	500 Ω



Voltage Waveform Pulse Duration



Voltage Waveform Propagation Delay Times Inverting and Non Inverting Outputs

Figure 1. Load Circuit and Voltage Waveforms

Notes: A. Includes test lead and test apparatus capacitance.
B. All pulses are supplied at pulse repetition rate ≤ 10 MHz.
C. Inputs are measured separately one transition per measurement.
D. t_{PLH} and t_{PHL} are the same as t_{PD}.

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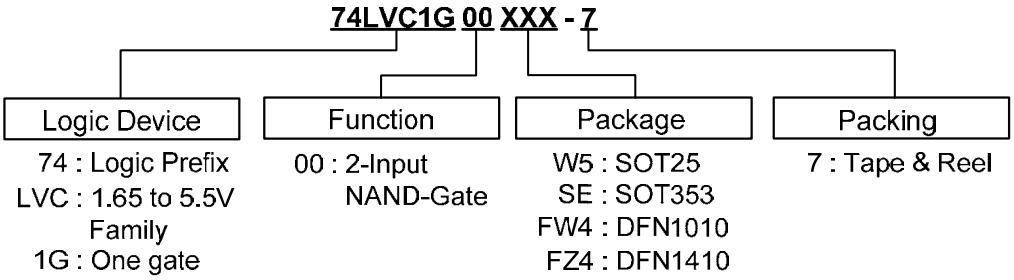
Ordering Information

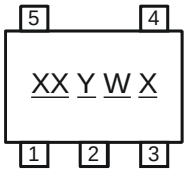


Device	Package Code	Packaging (Note 6)	7" Tape and Reel	
			Quantity	Part Number Suffix
74LVC1G00W5-7	W5	SOT25	3000/Tape & Reel	-7
74LVC1G00SE-7	SE	SOT353	3000/Tape & Reel	-7
74LVC1G00FW4-7	FW4	DFN1010	5000/Tape & Reel	-7
74LVC1G00FZ4-7	FZ4	DFN1410	5000/Tape & Reel	-7

Notes: 5. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.
6. The taping orientation is located on our website at http://www.diodes.com/datasheets/ap02007.pdf

Marking Information

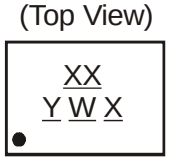
(1) SOT25 and SOT353



XX : Identification Code
Y : Year 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week;
z represents 52 and 53 week
X : A~Z : Internal Code

Part Number	Package	Identification Code
74LVC1G00W5	SOT25	US
74LVC1G00SE	SOT353	US

(2) DFN1010 and DFN1410



XX : Identification Code
Y : Year 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week;
z represents 52 and 53 week
X : A~Z : Internal Code

Part Number	Package	Identification Code
74LVC1G00FW4	DFN1010	US
74LVC1G00FZ4	DFN1410	US

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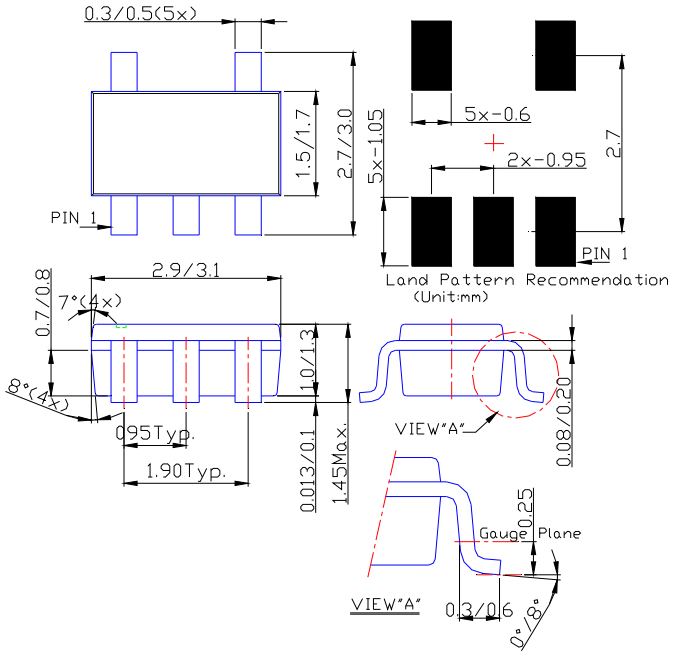
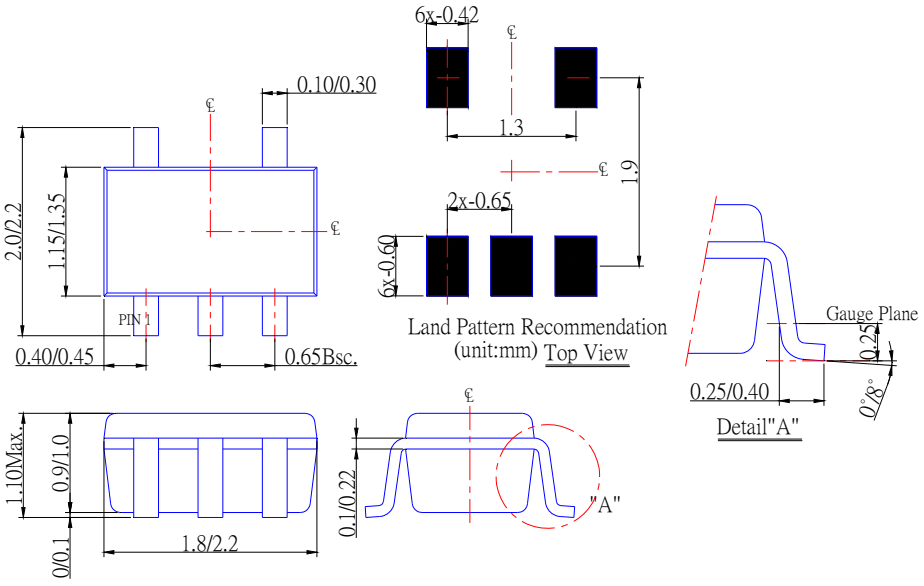
Package Outline Dimensions (All Dimensions in mm)

(1) Package Type: SOT25



(2) Package Type: SOT353



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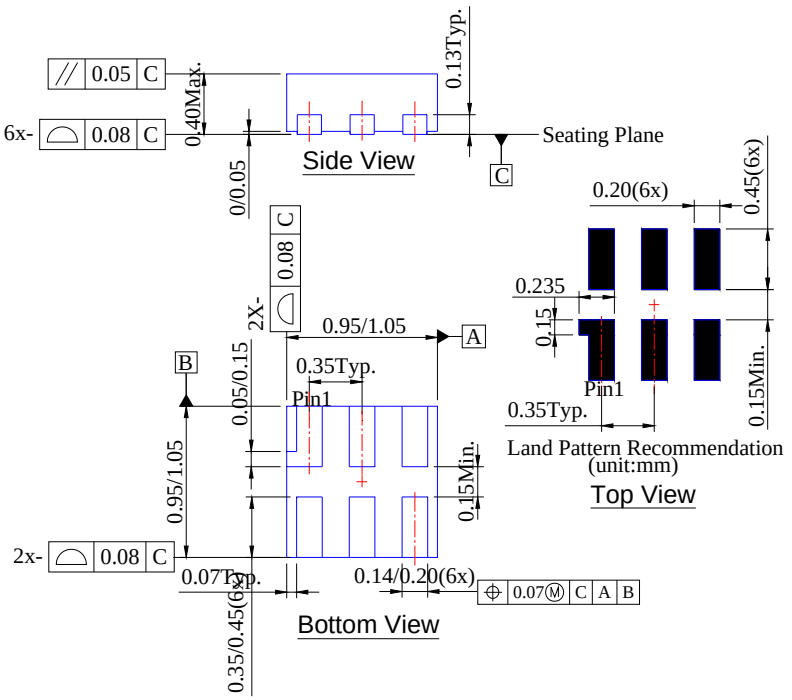
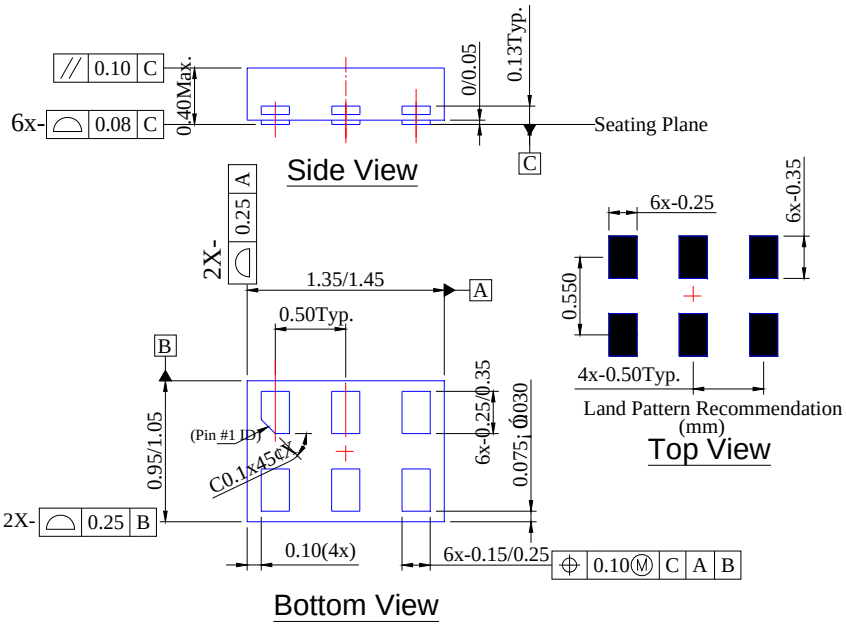
Package Outline Dimensions (cont.)

(3) Package Type DFN1010



(4) Package Type DFN1410



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