

Description

The 74LVC1G04 is a single inverter gate with a standard totem pole 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:

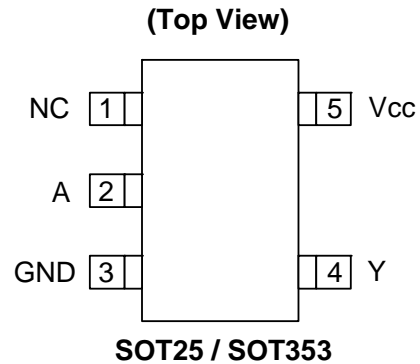
$$Y = \bar{A}$$

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 Exceeds JESD 22
- 200-V Machine Model (A115-A)
- 2000-V Human Body Model (A114-A)
- Latch-Up Exceeds 100mA per JESD 78, Class II
- Range of Package Options
- Direct Interface with TTL Levels
- SOT25 and SOT353: Assembled with “Green” Molding Compound (no Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 1)

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.

Pin Assignments



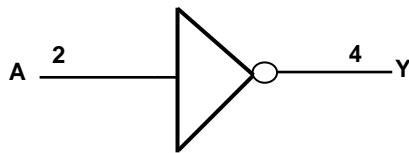
Applications

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

Pin Descriptions

Pin Name	Pin NO.	Description
NC	1	No Connection
A	2	Data Input
GND	3	Ground
Y	4	Data Output
Vcc	5	Supply Voltage

Logic Diagram



Function Table

Inputs	Output
A	Y
H	L
L	H

Absolute Maximum Ratings (Note 2)

Symbol	Description	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	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
	Continuous current through Vdd or GND	± 100	mA
T_J	Operating Junction Temperature	-40 to 150	$^{\circ}C$
T_{STG}	Storage Temperature	-65 to 150	$^{\circ}C$

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.

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} = 1.65 V to 1.95 V	0.65 X V _{CC}		V
		V _{CC} = 2.3 V to 2.7 V	1.7		
		V _{CC} = 3 V to 3.6 V	2		
		V _{CC} = 4.5 V to 5.5 V	0.7 X V _{CC}		
V _{IL}	Low-level input voltage	V _{CC} = 1.65 V to 1.95 V		0.35 X V _{CC}	V
		V _{CC} = 2.3 V to 2.7 V		0.7	
		V _{CC} = 3 V to 3.6 V		0.8	
		V _{CC} = 4.5 V to 5.5 V		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} = 1.65 V		-4	mA
		V _{CC} = 2.3 V		-8	
		V _{CC} = 3 V		-16	
		V _{CC} = 4.5 V		-32	
I _{OL}	Low-level output current	V _{CC} = 1.65 V		4	mA
		V _{CC} = 2.3 V		8	
		V _{CC} = 3 V		16	
		V _{CC} = 4.5 V		32	
Δt/ΔV	Input transition rise or fall rate	V _{CC} = 1.8 V ± 0.15V, 2.5 V ± 0.2 V		20	ns/V
		V _{CC} = 3.3 V ± 0.3 V		10	
		V _{CC} = 5 V ± 0.5 V		5	
T _A	Operating free-air temperature	-40	85	°C	

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

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

Over recommended free-air temperature range (unless otherwise noted)

Symbol	Parameter	Test Conditions	Vcc	Min	Typ.	Max	Unit
V _{OH}	High Level Output Voltage	I _{OH} = -100μA	1.65V to 5.5V	V _{CC} - 0.1			V
		I _{OH} = -4mA	1.65V	1.2			
		I _{OH} = -8mA	2.3V	1.9			
		I _{OH} = -16mA	3V	2.4			
		I _{OH} = -24mA		2.3			
		I _{OH} = -32mA	4.5V	3.8			
V _{OL}	High-level Input Voltage	I _{OL} = 100μA	1.65V to 5.5V			0.1	V
		I _{OL} = 4mA	1.65V			0.45	
		I _{OL} = 8mA	2.3V			0.3	
		I _{OL} = 16mA	3V			0.4	
		I _{OL} = 24mA				0.55	
		I _{OL} = 32mA	4.5			0.55	
I _I	Input Current	V _I = 5.5 V or GND	0 to 5.5V			± 5	μA
I _{OFF}	Power Down Leakage Current	V _I or V _O = 5.5V	0			± 10	μA
I _{CC}	Supply Current	V _I = 5.5V of GND I _O =0	1.65V to 5.5V			10	μA
ΔI _{CC}	Additional Supply Current	Input at V _{CC} -0.6 V	3 V to 5.5V			500	μA
C _i	Input Capacitance	V _i = V _{CC} - or GND	3.3		4		pF
θ _{JA}	Thermal Resistance Junction-to-Ambient	SOT25	(Note 4)		204		°C/W
		SOT353	(Note 4)		371		°C/W
θ _{JC}	Thermal Resistance Junction-to-Case	SOT25	(Note 4)		52		°C/W
		SOT353	(Note 4)		143		°C/W

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

Switching Characteristics

Over recommended free-air temperature range, $C_L = 15\text{pF}$ (see Figure 1)

Parameter	From (Input)	TO (OUTPUT)	$V_{CC} = 1.8\text{ V} \pm 0.15\text{V}$		$V_{CC} = 2.5\text{ V} \pm 0.2\text{V}$		$V_{CC} = 3.3\text{ V} \pm 0.3\text{V}$		$V_{CC} = 5\text{ V} \pm 0.5\text{V}$		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pd}	A	Y	2.0	6.4	1.0	4.2	0.7	3.3	0.7	3.1	ns

Over recommended free-air temperature range, $C_L = 30$ or 50pF as noted (see Figure 2)

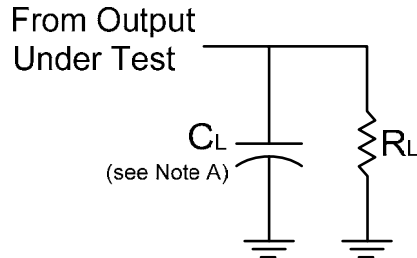
Parameter	From (Input)	TO (OUTPUT)	$V_{CC} = 1.8\text{ V} \pm 0.15\text{V}$		$V_{CC} = 2.5\text{ V} \pm 0.2\text{V}$		$V_{CC} = 3.3\text{ V} \pm 0.3\text{V}$		$V_{CC} = 5\text{ V} \pm 0.5\text{V}$		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pd}	A	Y	3.0	7.5	1.4	5.2	1.0	4.2	1.0	3.7	ns

Operating Characteristics

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

Parameter		Test Conditions	$V_{CC} = 1.8\text{ V}$	$V_{CC} = 2.5\text{ V}$	$V_{CC} = 3.3\text{ V}$	$V_{CC} = 5\text{ V}$	Unit
			TYP	TYP	TYP	TYP	
C_{pd}	Power dissipation capacitance	$f = 10\text{ MHz}$	16	18	18	20	pF

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	15pF	1MΩ
2.5V±0.2V	V _{CC}	≤2ns	V _{CC} /2	15pF	1MΩ
3.3V±0.3V	3V	≤2.5ns	1.5V	15pF	1MΩ
5V±0.5V	V _{CC}	≤2.5ns	V _{CC} /2	15pF	1MΩ

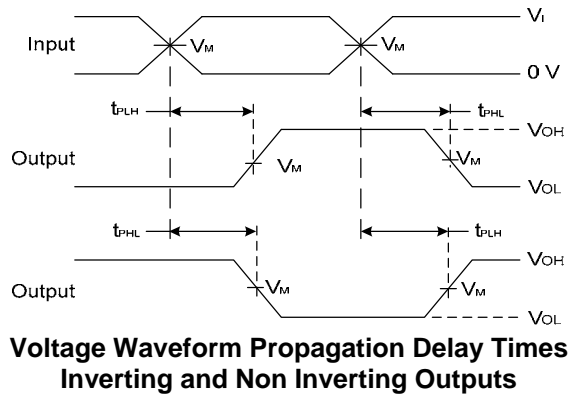
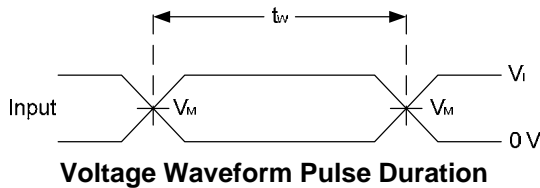
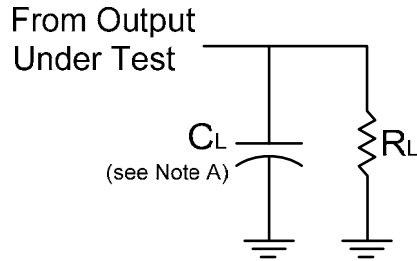


Figure 1. Load Circuit and Voltage Waveforms

- Notes:
- A. Includes test lead and test apparatus capacitance.
 - B. All pulses are supplied at pulse repetition rate ≤ 10 MHz.
 - C. t_{PLH} and t_{PHL} are the same as t_{PD}.

Parameter Measurement Information (Continued)



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	30pF	1KΩ
2.5V±0.2V	V _{CC}	≤2ns	V _{CC} /2	30pF	500Ω
3.3V±0.3V	3V	≤2.5ns	1.5V	50pF	500Ω
5V±0.5V	V _{CC}	≤2.5ns	V _{CC} /2	50pF	500Ω

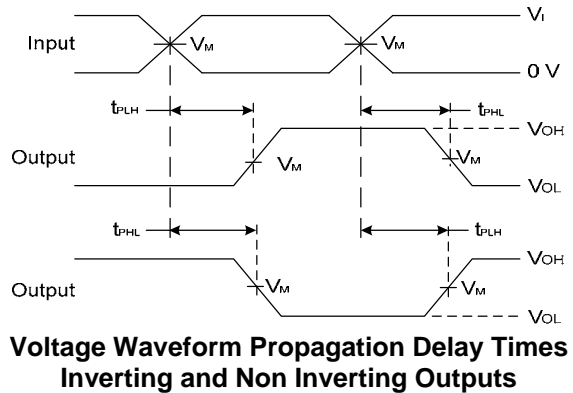
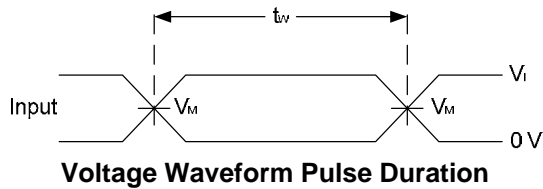
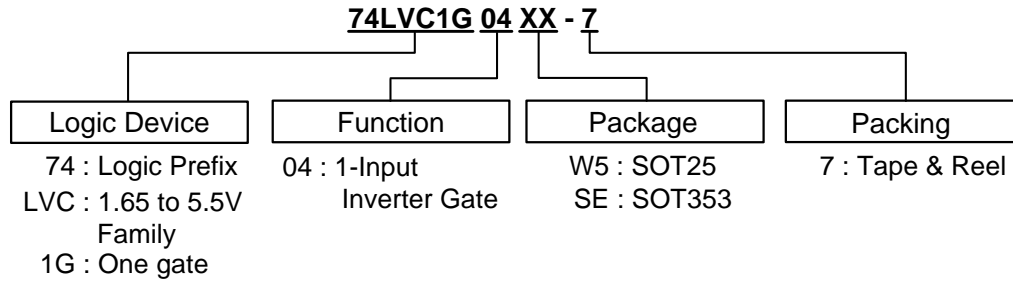


Figure 2. Load Circuit and Voltage Waveforms

- Notes:
- A. Includes test lead and test apparatus capacitance.
 - B. All pulses are supplied at pulse repetition rate ≤ 10 MHz.
 - C. t_{PLH} and t_{PHL} are the same as t_{PD}.

Ordering Information

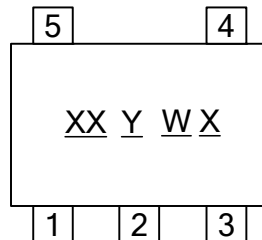


Device	Package Code	Packaging (Note 5)	7" Tape and Reel	
			Quantity	Part Number Suffix
74LVC1G04W5-7	W5	SOT25	3000/Tape & Reel	-7
74LVC1G04SE-7	SE	SOT353	3000/Tape & Reel	-7

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>.

Marking Information

(Top View)

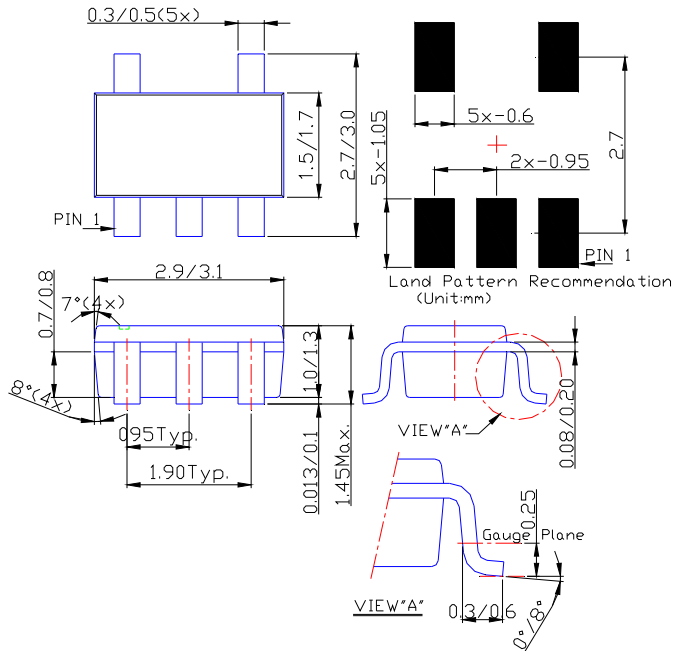


XX : Identification code
Y : Year 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents
52 and 53 week
X : A~Z : Internal code

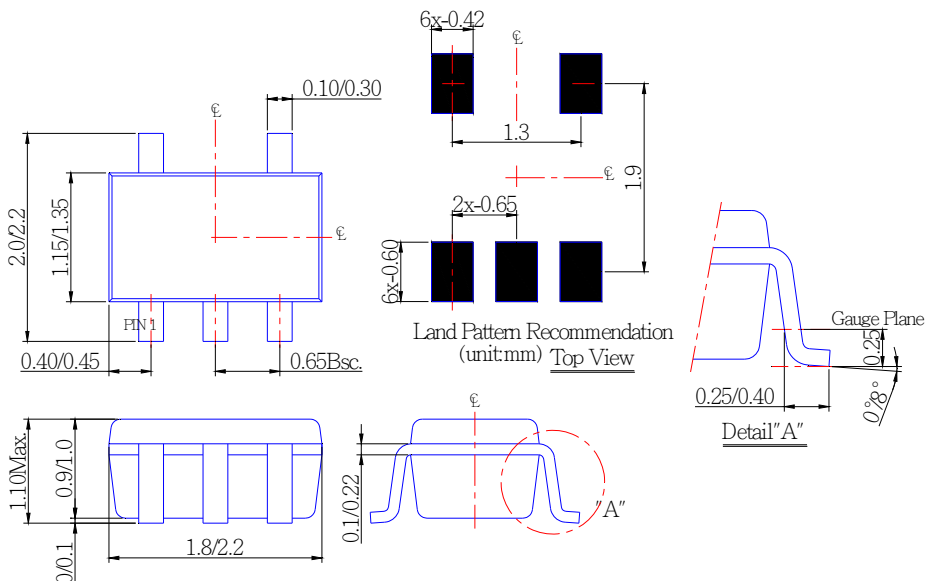
Part Number	Package	Identification Code
74LVC1G04W5	SOT25	UU
74LVC1G04SE	SOT353	UU

Package Outline Dimensions (All Dimensions in mm)

(1) Package Type: SOT25



(2) Package Type: SOT353



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