

Description

The 74LVC3G04 is a triple inverter gate with standard push-pull outputs. 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.

Each of the inverters performs the positive Boolean function:

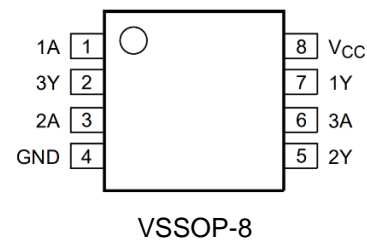
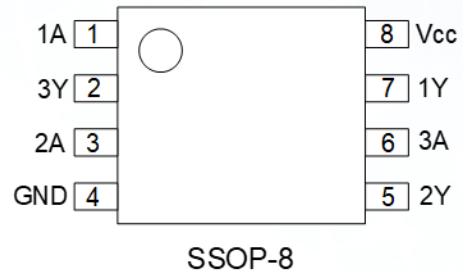
$$Y = \overline{A}$$

Features

- Wide Supply Voltage Range from 1.65V 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 2000V Human Body Model (A114)
Exceeds 1000V Charged Device Model (C101)
- Latch-Up Exceeds 100mA per JESD 78, Class I
- Range of Package Options
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](https://www.diodes.com/quality/product-definitions/) or your local Diodes representative.**
<https://www.diodes.com/quality/product-definitions/>

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> 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.

Pin Assignments



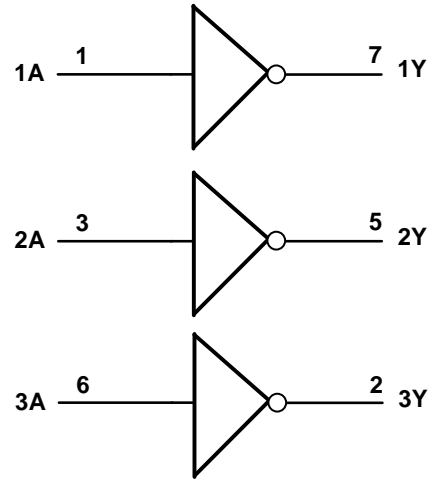
Applications

- 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 boxes
 - Cell phones, personal navigation/GPS
 - MP3 players, cameras, video recorders

Pin Descriptions

Pin Name	Pin NO.	Description
1A	1	Data Input
3Y	2	Data Output
2A	3	Data Input
GND	4	Ground
2Y	5	Data Output
3A	6	Data Input
1Y	7	Data Output
V _{CC}	8	Supply Voltage

Logic Diagram



Function Table

Inputs	Output
A	Y
H	L
L	H

Absolute Maximum Ratings (Notes 4, 5)

Symbol	Description	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	kV
ESD CDM	Charged Device Model ESD Protection	1	kV
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	-0.5 to V _{CC} + 0.5	V
I _{IK}	Input Clamp Current V _I < 0	-50	mA
I _{OK}	Output Clamp Current V _O < 0	-50	mA
I _O	Continuous Output Current	±50	mA
I _{CC} , I _{GND}	Continuous Current Through V _{CC} or GND	±100	mA
T _J	Junction Temperature	+150	°C
T _{STG}	Storage Temperature	-65 to +150	°C

- Notes:
- Stresses beyond the absolute maximum can result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.
 - Forcing the maximum allowed voltage could cause a condition exceeding the maximum current or conversely forcing the maximum current could cause a condition exceeding the maximum voltage. The ratings of both current and voltage must be maintained within the controlled range.

Recommended Operating Conditions (Note 6)

Symbol	Parameter	Conditions	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	
		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	
		V _{CC} = 4.5V	—	32	
Δt/ΔV	Input Transition Rise or Fall Rate	V _{CC} = 1.8V ± 0.15V, 2.5V ± 0.2V	—	20	ns/V
		V _{CC} = 1.65V to 2.7V	—	10	
		V _{CC} = 2.7V to 5V	—	5	
T _A	Operating Free-Air Temperature	—	-40	+125	°C

Note: 6. Unused inputs should be held at V_{CC} or Ground for device proper operation.

Electrical Characteristics

Symbol	Parameter	Test Conditions	V _{CC}	-40°C to +85°C		-40°C to +125°C		Unit
				Min	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	—	1.2	—	
		I _{OH} = -8mA	2.3V	1.9	—	1.9	—	
		I _{OH} = -16mA	3V	2.4	—	2.4	—	
		I _{OH} = -24mA		2.3	—	2.3	—	
		I _{OH} = -32mA	4.5V	3.8	—	3.8	—	
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	—	0.45	
		I _{OL} = 8mA	2.3V	—	0.3	—	0.3	
		I _{OL} = 16mA	3V	—	0.4	—	0.4	
		I _{OL} = 24mA		—	0.55	—	0.55	
		I _{OL} = 32mA	4.5V	—	0.55	—	0.75	
I _I	Input Current	V _I = 5.5V or GND	0 to 5.5V	—	±5	—	±5	μA
I _{OFF}	Power Down Leakage Current	V _I or V _O = 5.5V	0	—	±10	—	±10	μA
I _{CC}	Supply Current	V _I = 5.5V or GND, I _O = 0	1.65V to 5.5V	—	10	—	10	μA
ΔI _{CC}	Additional Supply Current	Input at V _{CC} - 0.6 V	3V to 5.5V	—	500	—	500	μA
C _I	Input Capacitance	V _I = V _{CC} or GND	3.3V	—	3.5 (Typ)	—	—	pF

Package Characteristics

Symbol	Parameter	Package	Test Conditions	Min	Typ	Max	Unit
Θ _{JA}	Thermal Resistance Junction-to-Ambient	SSOP-8	Note 7	—	130	—	°C/W
		VSSOP-8	Note 7	—	155	—	°C/W
Θ _{JC}	Thermal Resistance Junction-to-Case	SSOP-8	Note 7	—	36	—	°C/W
		VSSOP-8	Note 7	—	38	—	°C/W

Note: 7. Test condition: Device mounted on JEDEC 2s2p High-K board, FR-4 substrate PCB, 2oz copper with minimum recommended pad layout.

Operating Characteristics (T_A = +25°C, V_{CC} = 3.3V)

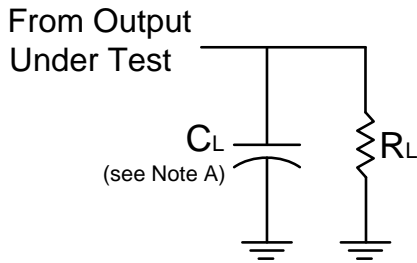
Symbol	Parameter	Test Conditions	V _{CC} = 1.8V	V _{CC} = 2.5V	V _{CC} = 3.3V	V _{CC} = 5V	Unit
			Typ	Typ	Typ	Typ	
CPD	Power Dissipation Capacitance	f = 10MHz 1 Input Switching	16	16	18	22	pF

Switching Characteristics

Figure 1

Parameter	From Input	To Output	V _{CC}	T _A = -40°C to +85°C		T _A = -40°C to +125°C		Unit
				Min	Max	Min	Max	
t _{PD}	A	Y	1.8V ± 0.15V	3.2	7.9	3.2	8.9	ns
			2.5V ± 0.2V	1.5	4.4	1.5	5.4	
			3.3V ± 0.3V	1.4	4.1	1.4	5.1	
			5.0V ± 0.5V	1.1	3.2	1.1	3.8	

Parameter Measurement Information (Notes B, C, D)



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
5.0V ± 0.5V	V _{CC}	≤2.5ns	V _{CC} / 2	50pF	500Ω

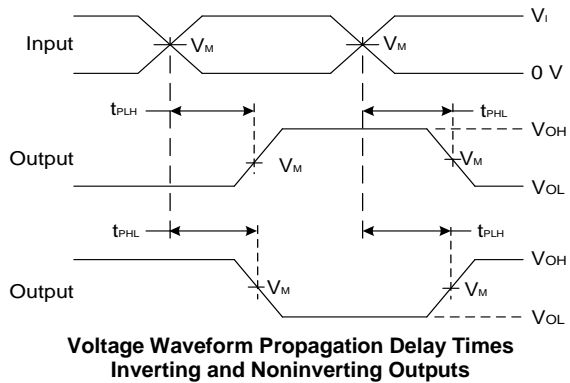
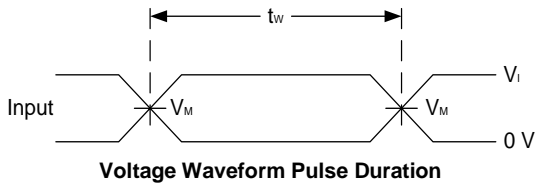
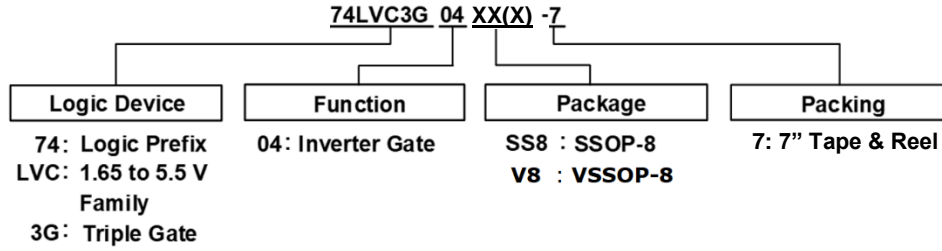


Figure 1. Load Circuit and Voltage Waveforms

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

Ordering Information



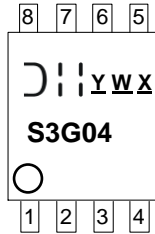
Part Number	Package Code	Package	Packing	
			Qty.	Carrier
74LVC3G04SS8-7	SS8	SSOP-8	3000	7" Tape and Reel (Note 8)
74LVC3G04V8-7	V8	VSSOP-8	3000	7" Tape and Reel (Note 8)

Note: 8. The taping orientation is located on our website at <http://www.diodes.com/package-outlines.html>.

Marking Information

SSOP-8

(Top View)

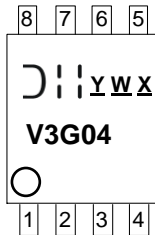


Y : Year : 0 to 9
W : Week : A to Z : 1 to 26 week;
 a to z : 27 to 52 week; z represents
 52 and 53 week
X : Internal Code

Part Number	Package	Identification Code
74LVC3G04SS8-7	SSOP-8	S3G04

VSSOP-8

(Top View)



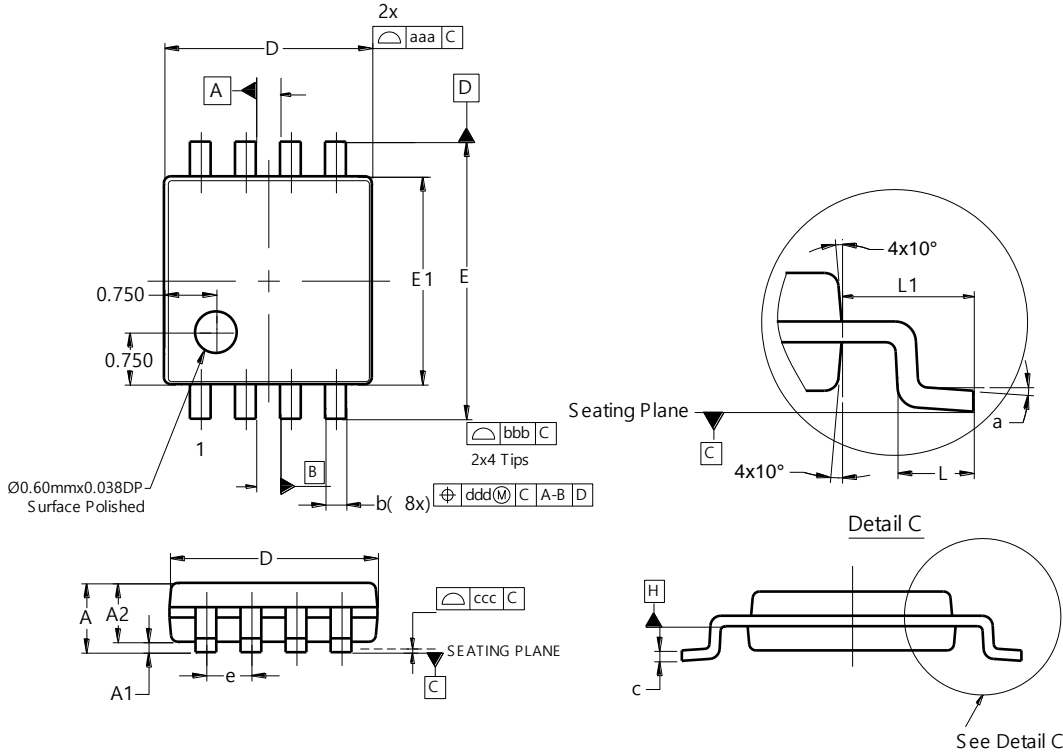
Y : Year : 0 to 9
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 a to z : 27 to 52 week; z represents
 52 and 53 week
X : Internal Code

Part Number	Package	Identification Code
74LVC3G04V8-7	VSSOP-8	V3G04

Package Outline Dimensions

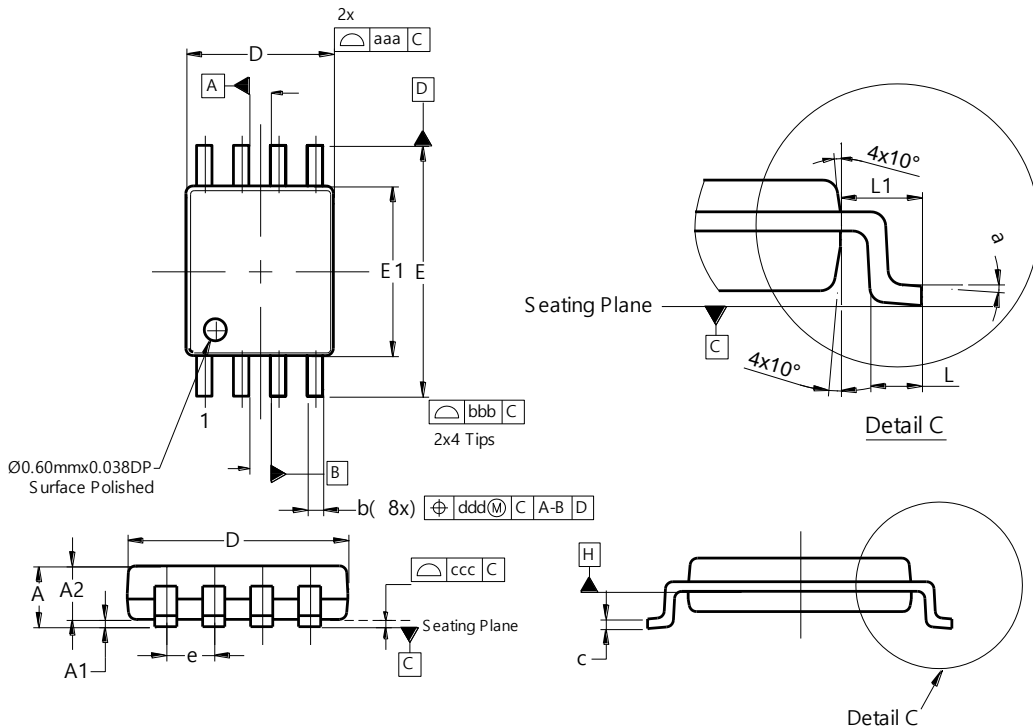
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SSOP-8



SSOP-8			
Dim	Min	Max	Typ
A	--	1.30	--
A1	0.05	0.15	--
A2	0.95	1.20	1.05
b	0.15	0.30	0.225
c	0.08	0.23	--
D	2.75	3.15	2.95
E	3.75	4.25	4.00
E1	2.70	2.90	2.80
e	--	--	0.65
L	0.20	0.60	0.40
L1	0.525	0.675	0.60
a	0°	8°	4°
aaa	0.20		
bbb	0.25		
ccc	0.10		
ddd	0.13		
All Dimensions in mm			

VSSOP-8

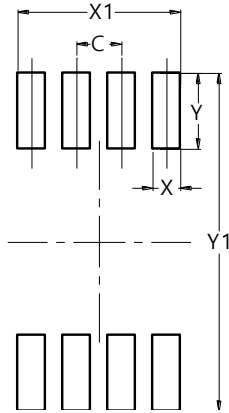


VSSOP-8			
Dim	Min	Max	Typ
A	0.60	0.90	--
A1	--	0.10	--
A2	0.60	0.80	--
b	0.17	0.25	0.21
c	0.08	0.13	--
D	1.90	2.10	2.00
E	3.20	3.60	3.40
E1	2.20	2.40	2.30
e	--	--	0.50
L	0.30	0.40	0.35
L1	0.50	0.60	0.55
a	0°	6°	3°
aaa	0.20		
bbb	0.25		
ccc	0.10		
ddd	0.13		
All Dimensions in mm			

Suggested Pad Layout

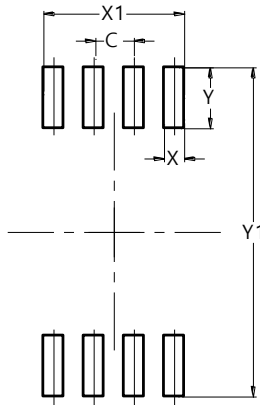
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SSOP-8



Dimensions	Value (in mm)
C	0.650
X	0.400
X1	2.350
Y	1.100
Y1	4.900

VSSOP-8



Dimensions	Value (in mm)
C	0.500
X	0.250
X1	1.750
Y	0.750
Y1	4.050

Mechanical Data

SSOP-8

- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.0169 grams (Approximate)

VSSOP-8

- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.011 grams (Approximate)

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