



灵星芯微 芯片经营

# SN74LVC2GU04(LX) Dual Unbuffered Inverter

## Product Specification

### Specification Revision History:

Version	Date	Description
2017-05-A1	2017-05	New
2023-04-B1	2023-04	Update the template



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## 1、 General Description

The SN74LVC2GU04 provides two unbuffered inverters. Each inverter is a single stage with unbuffered output. The inputs can be driven from either 3.3V or 5V devices. This feature allows the use of this device in a mixed 3.3V and 5V environment.

### Features:

- Wide supply voltage range from 1.65V to 5.5V
- 5V tolerant inputs for interfacing with 5V logic
- $\pm 24\text{mA}$  output drive ( $V_{CC}=3.0\text{V}$ )
- CMOS low power consumption
- Specified from  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Packaging information: SOT-23-6/SOT-363

### Ordering Information:

#### Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
SN74LVC2GU04DB(LX)	SOT-23-6	BJXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
SN74LVC2GU04DC(LX)	SOT-363	BJXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing: 0.65mm

Note 1: "XX" refers to variable content, meaning year and package batch serial number.

Note 2: If the physical information is inconsistent with the ordering information, please refer to the actual product.



## 2、Block Diagram And Pin Description

### 2.1、Block Diagram

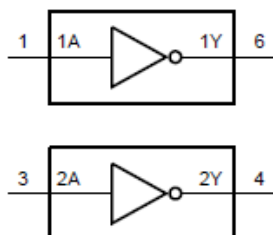


Figure 1. Logic symbol

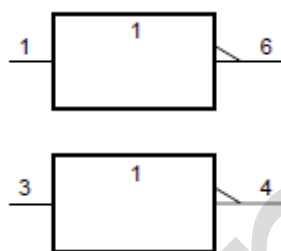


Figure 2. IEC logic symbol

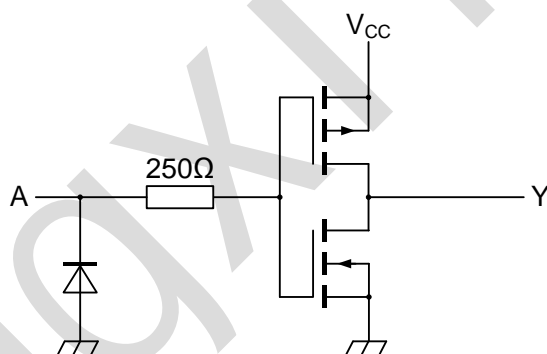
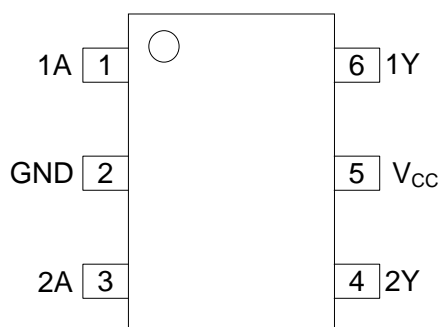


Figure 3. Logic diagram (one gate)

### 2.2、Pin Configurations





### 2.3、Pin Description

Pin No.	Pin Name	Description
1	1A	data input
2	GND	ground (0V)
3	2A	data input
4	2Y	data output
5	V <sub>CC</sub>	supply voltage
6	1Y	data output

### 2.4、Function Table

Input	Output
nA	nY
L	H
H	L

Note: H=HIGH voltage level; L=LOW voltage level.

## 3、Electrical Parameter

### 3.1、Absolute Maximum Ratings

(Voltages are referenced to GND(ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V <sub>CC</sub>	-	-0.5	+6.5	V
input clamping current	I <sub>IK</sub>	V <sub>I</sub> < 0V	-50	-	mA
input voltage	V <sub>I</sub>	-	-0.5	+6.5	V
output clamping current	I <sub>OK</sub>	V <sub>O</sub> < 0V	-50	-	mA
output voltage	V <sub>O</sub>	Active mode	-0.5	V <sub>CC</sub> +0.5	V
output current	I <sub>O</sub>	V <sub>O</sub> =0V to V <sub>CC</sub>	-	±50	mA
supply current	I <sub>CC</sub>	-	-	100	mA
ground current	I <sub>GND</sub>	-	-100	-	mA
total power dissipation	P <sub>tot</sub>	-	-	250	mW
storage temperature	T <sub>stg</sub>	-	-65	+150	°C
soldering temperature	T <sub>L</sub>	10s	260		°C

Note: When V<sub>CC</sub>=0V (Power-down mode), the output voltage can be 5.5V in normal operation.

### 3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V <sub>CC</sub>	-	1.65	-	5.5	V
input voltage	V <sub>I</sub>	-	0	-	5.5	V
output voltage	V <sub>O</sub>	Active mode	0	-	V <sub>CC</sub>	V
ambient temperature	T <sub>amb</sub>	-	-40	-	+125	°C



### 3.3、Electrical Characteristics

#### 3.3.1、DC Characteristics 1

( $T_{amb} = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ , voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
HIGH-level input voltage	$V_{IH}$	$V_{CC}=1.65\text{V}$ to $5.5\text{V}$	$0.75 \times V_{CC}$	-	-	V	
LOW-level input voltage	$V_{IL}$	$V_{CC}=1.65\text{V}$ to $5.5\text{V}$	-	-	$0.25 \times V_{CC}$	V	
HIGH-level output voltage	$V_{OH}$	$V_I = V_{IH}$ or $V_{IL}$	$I_O = -100\mu\text{A}; V_{CC}=1.65\text{V}$ to $5.5\text{V}$	$V_{CC} - 0.1$	-	-	V
			$I_O = -4\text{mA}; V_{CC}=1.65\text{V}$	1.2	-	-	V
			$I_O = -8\text{mA}; V_{CC}=2.3\text{V}$	1.9	-	-	V
			$I_O = -12\text{mA}; V_{CC}=2.7\text{V}$	2.2	-	-	V
			$I_O = -24\text{mA}; V_{CC}=3.0\text{V}$	2.3	-	-	V
			$I_O = -32\text{mA}; V_{CC}=4.5\text{V}$	3.8	-	-	V
LOW-level output voltage	$V_{OL}$	$V_I = V_{IH}$ or $V_{IL}$	$I_O = 100\mu\text{A}; V_{CC}=1.65\text{V}$ to $5.5\text{V}$	-	-	0.10	V
			$I_O = 4\text{mA}; V_{CC}=1.65\text{V}$	-	-	0.45	V
			$I_O = 8\text{mA}; V_{CC}=2.3\text{V}$	-	-	0.30	V
			$I_O = 12\text{mA}; V_{CC}=2.7\text{V}$	-	-	0.40	V
			$I_O = 24\text{mA}; V_{CC}=3.0\text{V}$	-	-	0.55	V
			$I_O = 32\text{mA}; V_{CC}=4.5\text{V}$	-	-	0.55	V
input leakage current	$I_I$	$V_I = 5.5\text{V}$ or GND; $V_{CC} = 0\text{V}$ to $5.5\text{V}$	-	-	$\pm 1$	$\mu\text{A}$	
supply current	$I_{CC}$	$V_I = 5.5\text{V}$ or GND; $I_O = 0\text{A};$ $V_{CC} = 1.65\text{V}$ to $5.5\text{V}$	-	-	4	$\mu\text{A}$	
input capacitance	$C_I$	$V_{CC} = 3.3\text{V}; V_I = \text{GND}$ to $V_{CC}$	-	5	-	pF	

Note: All typical values are measured at  $V_{CC} = 3.3\text{V}$  and  $T_{amb} = 25^{\circ}\text{C}$ .



### 3.3.2、DC Characteristics 2

( $T_{amb}=-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ , voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
HIGH-level input voltage	$V_{IH}$	$V_{CC}=1.65\text{V}$ to $5.5\text{V}$	$0.75 \times V_{CC}$	-	-	V	
LOW-level input voltage	$V_{IL}$	$V_{CC}=1.65\text{V}$ to $5.5\text{V}$	-	-	$0.25 \times V_{CC}$	V	
HIGH-level output voltage	$V_{OH}$	$V_I = V_{IH}$ or $V_{IL}$	$I_O=-100\mu\text{A}; V_{CC}=1.65\text{V}$ to $5.5\text{V}$	$V_{CC} - 0.1$	-	-	V
			$I_O=-4\text{mA}; V_{CC}=1.65\text{V}$	0.95	-	-	V
			$I_O=-8\text{mA}; V_{CC}=2.3\text{V}$	1.7	-	-	V
			$I_O=-12\text{mA}; V_{CC}=2.7\text{V}$	1.9	-	-	V
			$I_O=-24\text{mA}; V_{CC}=3.0\text{V}$	2.0	-	-	V
			$I_O=-32\text{mA}; V_{CC}=4.5\text{V}$	3.4	-	-	V
LOW-level output voltage	$V_{OL}$	$V_I = V_{IH}$ or $V_{IL}$	$I_O=100\mu\text{A}; V_{CC}=1.65\text{V}$ to $5.5\text{V}$	-	-	0.10	V
			$I_O=4\text{mA}; V_{CC}=1.65\text{V}$	-	-	0.70	V
			$I_O=8\text{mA}; V_{CC}=2.3\text{V}$	-	-	0.45	V
			$I_O=12\text{mA}; V_{CC}=2.7\text{V}$	-	-	0.60	V
			$I_O=24\text{mA}; V_{CC}=3.0\text{V}$	-	-	0.80	V
			$I_O=32\text{mA}; V_{CC}=4.5\text{V}$	-	-	0.80	V
input leakage current	$I_I$	$V_I=5.5\text{V}$ or GND; $V_{CC}=0\text{V}$ to $5.5\text{V}$	-	-	$\pm 1$	$\mu\text{A}$	
supply current	$I_{CC}$	$V_I=5.5\text{V}$ or GND; $I_O=0\text{A}; V_{CC}=1.65\text{V}$ to $5.5\text{V}$	-	-	4	$\mu\text{A}$	

### 3.3.3、AC Characteristics 1

( $T_{amb}=-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ , voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ. <sup>[1]</sup>	Max.	Unit	
nA to nY propagation delay	$t_{PLH}, t_{PHL}$	see Figure 5	$V_{CC}=1.65\text{V}$ to $1.95\text{V}$	-	4.6	6.9	ns
			$V_{CC}=2.3\text{V}$ to $2.7\text{V}$	-	3.6	5.4	ns
			$V_{CC}=2.7\text{V}$	-	5.2	7.8	ns
			$V_{CC}=3.0\text{V}$ to $3.6\text{V}$	-	4.6	6.9	ns
			$V_{CC}=4.5\text{V}$ to $5.5\text{V}$	-	3.4	5.1	ns

Note:

[1] Typical values are measured at  $T_{amb}=25^{\circ}\text{C}$  and  $V_{CC}=1.8\text{V}, 2.5\text{V}, 2.7\text{V}, 3.3\text{V}$  and  $5.0\text{V}$  respectively.

### 3.3.4、AC Characteristics 2

( $T_{amb}=-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ , voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
nA to nY propagation delay	$t_{pd}$	see Figure 5	$V_{CC}=1.65\text{V}$ to $1.95\text{V}$	-	-	8.7	ns
			$V_{CC}=2.3\text{V}$ to $2.7\text{V}$	-	-	6.8	ns
			$V_{CC}=2.7\text{V}$	-	-	9.7	ns
			$V_{CC}=3.0\text{V}$ to $3.6\text{V}$	-	-	8.4	ns
			$V_{CC}=4.5\text{V}$ to $5.5\text{V}$	-	-	6.5	ns



## 4、Testing Circuit

### 4.1、AC Testing Circuit

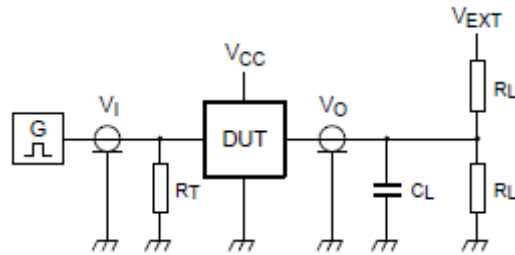


Figure 4. Test circuit for measuring switching times

Definitions for test circuit:

$R_L$ =Load resistance.

$C_L$ =Load capacitance including jig and probe capacitance.

$R_T$ =Termination resistance; should be equal to the output impedance  $Z_o$  of the pulse generator.

$V_{EXT}$ =External voltage for measuring switching times.

### 4.2、AC Testing Waveforms

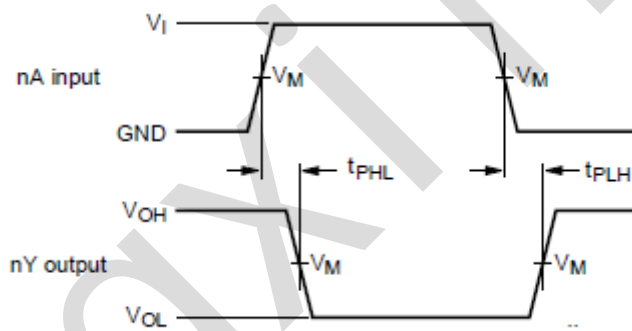


Figure 5. The input (nA) to output (nY) propagation delay times





#### 4.3、Measurement Points

Supply voltage	Input	Output
$V_{CC}$	$V_M$	$V_M$
1.65V to 1.95V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
2.3V to 2.7V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
2.7V	1.5V	1.5V
3.0V to 3.6V	1.5V	1.5V
4.5V to 5.5V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$

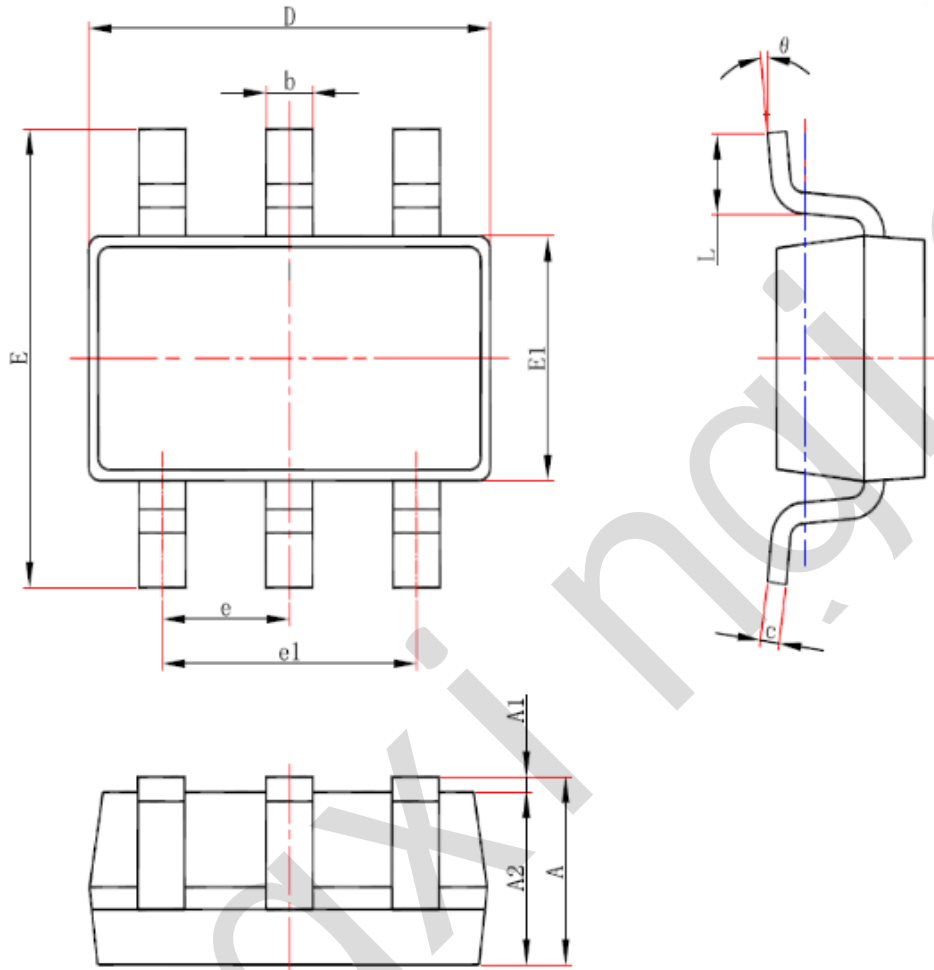
#### 4.4、Test Data

Supply voltage	Input		Load		$V_{EXT}$
	$V_I$	$t_r = t_f$	$C_L$	$R_L$	$t_{PLH}, t_{PHL}$
1.65V to 1.95V	$V_{CC}$	$\leq 3ns$	30pF	1k $\Omega$	open
2.3V to 2.7V	$V_{CC}$	$\leq 3ns$	30pF	500 $\Omega$	open
2.7V	2.7V	$\leq 3ns$	50pF	500 $\Omega$	open
3.0V to 3.6V	2.7V	$\leq 3ns$	50pF	500 $\Omega$	open
4.5V to 5.5V	$V_{CC}$	$\leq 3ns$	50pF	500 $\Omega$	open



## 5、Package Information

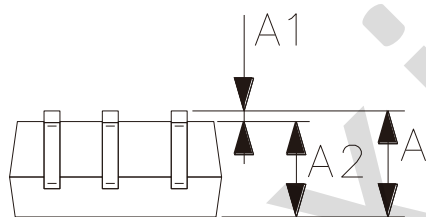
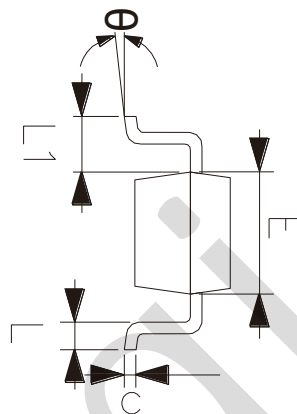
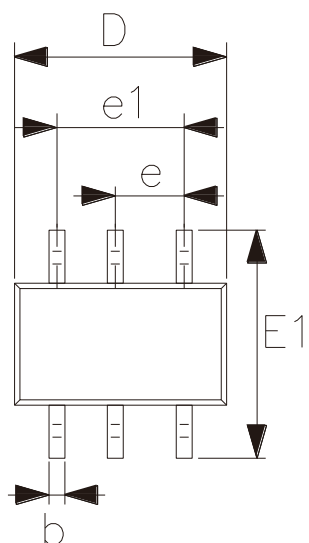
### 5.1、SOT-23-6



Symbol	Dimensions (mm)	
	Min.	Max.
A	-	1.25
A1	0.00	0.12
A2	1.00	1.20
b	0.30	0.50
c	0.10	0.20
D	2.82	3.02
E	2.60	3.00
E1	1.50	1.70
e	0.95	
e1	1.80	2.00
L	0.30	0.60
θ	0°	8°



5.2、SOT-363



Symbol	Dimensions (mm)	
	Min.	Max.
A	0.90	1.10
A1	0.00	0.10
A2	0.90	1.00
b	0.15	0.35
c	0.11	0.175
D	2.00	2.20
E1	2.15	2.45
E	1.15	1.35
e	0.65	
e1	1.20	1.40
L	0.26	0.46
L1	0.525	
$\theta$	0°	8°



## 6、Statements

### 6.1、The name and content of Hazardous substances or Elements in the product

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butylbenzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	<p>○: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard.</p> <p>×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.</p>									