



## General Description

The operating voltage range of the single inverter is 1.65V to 5.5V.

The SN74LVC1G04 device contains single inverter and performs the Boolean function  $Y = \overline{A}$ .

The CMOS device has high output drive while maintaining low static power dissipation over a broad  $V_{CC}$  operating range.

This device is fully specified for partial-power-down applications using  $I_{off}$ .

The  $I_{off}$  circuitry disables the outputs, preventing damaging current back flow through the device when it is powered down.

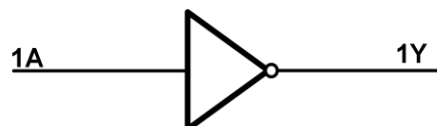
## Features

- Low power consumption, 10- $\mu$ A max  $I_{CC}$
- Supports 5V  $V_{CC}$  operation
- Inputs accept voltages to 5.5 V
- Max tpd of 3.3 ns at 3.3V
- $\pm 24$ -mA output drive at 3.3V
- $I_{off}$  supports partial-power-down mode
- Typical  $V_{OHV} > 2V$  at  $V_{CC} = 3.3V$ ,  $T_A = 25^\circ C$
- Typical  $V_{OLP} < 0.8V$  at  $V_{CC} = 3.3V$ ,  $T_A = 25^\circ C$

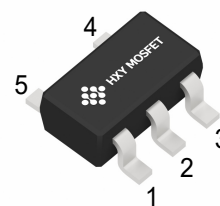
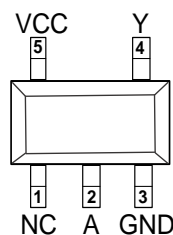
## Applications

- AV receivers
- Audio docks: portable
- Blu-ray players and home theater
- Embedded PC
- MP3 player/recorder (portable audio)
- Personal digital assistant (PDA)
- Power: telecom/server AC/DC supply
- Solid state drive (SSD):  
client and enterprise TV: LCD/  
digital and high -definition (HDTV)

## Functional Block Diagram



## Pinning and Pin Functions



SOT-23-5L/SOT-353(SC-70-5)

Pin		Type	Description
Name	OT-23-5L/SOT-353 (SC-70-5)		
NC	1	—	No internal connection
A	2	I	Input
GND	3	—	Ground
Y	4	O	Output
VCC	5	—	Positive Supply



## Absolute Maximum Ratings

Parameters		Min	Max.	Unit
$V_{CC}$	Supply voltage range	-0.5	6.5	V
$V_I$	Input voltage range	-0.5	6.5	V
$V_O$	Voltage range applied to any output in the high-impedance or power-off state	-0.5	6.5	V
$V_O$	Voltage range applied to any output in the high or low state	-0.5	$V_{CC}+0.5$	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		$\pm 50$	mA
Continuous current through $V_{CC}$ or GND			$\pm 100$	mA
$T_J$	Junction temperature under bias		150	$^{\circ}\text{C}$
$T_{stg}$	Storage temperature range	-65	150	$^{\circ}\text{C}$

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.

## Recommended Operating Conditions

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

Symbol	Parameter		Min	Max	Unit
$V_{CC}$	Supply voltage		1.65	5.5	V
$V_I$	Input voltage		0	5.5	V
$V_O$	Output voltage		0	$V_{CC}$	V
$I_{OH}$	High-level output current	$V_{CC}=1.65\text{V}$		-4	mA
		$V_{CC}=2.3\text{V}$		-8	
		$V_{CC}=3\text{V}$		-16	
				-24	
		$V_{CC}=4.5\text{V}$		-32	
$I_{OL}$	Low-level output current	$V_{CC}=1.65\text{V}$		4	mA
		$V_{CC}=2.3\text{V}$		8	
		$V_{CC}=3\text{V}$		16	
				24	
		$V_{CC}=4.5\text{V}$		32	
$T_A$	Operating free-air temperature		-40	125	$^{\circ}\text{C}$

## ESD Ratings

ESD			Value	Unit
$V(\text{ESD})$	Electrostatic discharge	Human-body model (HBM)	6 K	V
		Charge device model (CDM)	2 K	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.



## Thermal Information

Package Type	$\theta_{JA}$	$\theta_{JC}$	Unit
SOT-23-5L	250	81	°C/W
SOT-353(SC-70-5)	400	150	°C/W

## Electrical Characteristics

V<sub>CC</sub>=5.0V or 3.3V, FULL=−40°C to +125°C, Typical values are at T<sub>A</sub>=+25°C. (unless otherwise noted)

Parameter	Test Conditions	V <sub>CC</sub>	−40°C to 85°C			−40°C to 125°C			Unit
			Min	Typ	Max	Min	Typ	Max	
V <sub>OH</sub>	I <sub>OH</sub> =−100 μA	1.65 V to 5.5 V	V <sub>CC</sub> −0.1			V <sub>CC</sub> −0.1			V
	I <sub>OH</sub> =−4 mA	1.65 V	1.2			1.2			
	I <sub>OH</sub> =−8 mA	2.3 V	1.9			1.9			
	I <sub>OH</sub> =−16 mA	3 V	2.4			2.4			
	I <sub>OH</sub> =−24 mA		2.3			2.3			
	I <sub>OH</sub> =−32 mA	4.5 V	3.8			3.8			
V <sub>OL</sub>	I <sub>OL</sub> =100 μA	1.65 V to 5.5 V			0.1			0.1	V
	I <sub>OL</sub> =4 mA	1.65 V			0.45			0.45	
	I <sub>OL</sub> =8 mA	2.3 V			0.3			0.3	
	I <sub>OL</sub> =16 mA	3 V			0.4			0.4	
	I <sub>OL</sub> =24 mA				0.55			0.55	
	I <sub>OL</sub> =32 mA	4.5 V			0.55			0.55	
I <sub>I</sub>	A input	V <sub>I</sub> =5.5 V or GND	0 to 5.5 V					±5	μA
I <sub>off</sub>		V <sub>I</sub> or V <sub>O</sub> =5.5 V	0					±10	μA
I <sub>CC</sub>		V <sub>I</sub> =5.5 V or GND, I <sub>O</sub> =0	1.65 V to 5.5 V					10	μA
ΔI <sub>CC</sub>		One input at V <sub>CC</sub> − 0.6 V, Other inputs at V <sub>CC</sub> or GND	3 V to 5.5 V					500	μA
C <sub>i</sub>		V <sub>I</sub> =V <sub>CC</sub> or GND	3.3 V				5		pF

(1) All unused digital inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation.

V<sub>CC</sub>=5.0V or 3.3V, FULL=−40°C to +125°C, Typical values are at T<sub>A</sub>=+25°C. (unless otherwise noted)

Parameter	From (Input)	To (Output)	−40°C to 125°C								Unit
			V <sub>CC</sub> =1.8 V ± 0.15 V		V <sub>CC</sub> =2.5 V ± 0.2 V		V <sub>CC</sub> =3.3 V ± 0.3 V		V <sub>CC</sub> =5 V ± 0.5 V		
			Min	Max	Min	Max	Min	Max	Min	Max	
t <sub>pd</sub>	A	Y	3.9	8.0	1.4	3.5	1	3.3	1	3.0	ns

T<sub>A</sub>=25°C

Parameter		Test Conditions	V <sub>CC</sub> =1.8 V	V <sub>CC</sub> =2.5 V	V <sub>CC</sub> =3.3 V	V <sub>CC</sub> =5 V	Unit
			Typ	Typ	Typ	Typ	
C <sub>pd</sub>	Power dissipation capacitance	f=10 MHz	17	18	25	30	pF



Typical Characteristics

Over recommended operating free-air temperature range,  $C_L=30\text{ pF}$  or  $50\text{ pF}$  (unless otherwise noted).

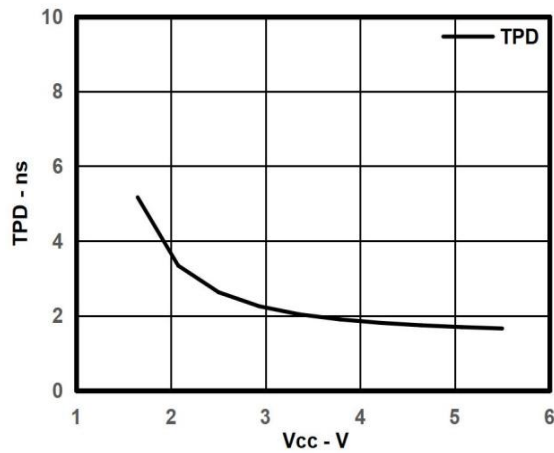


Fig.8-1. Typical Tpd vs Vcc

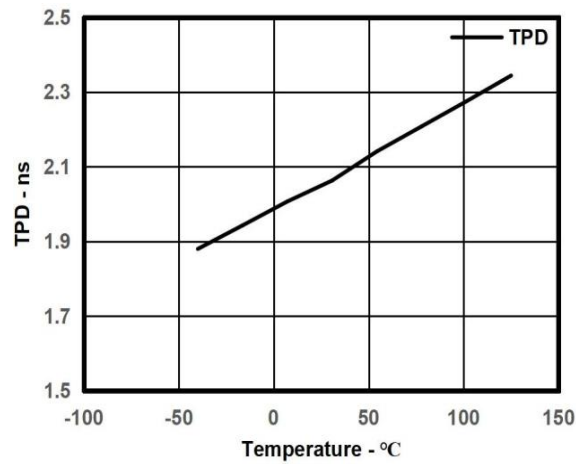
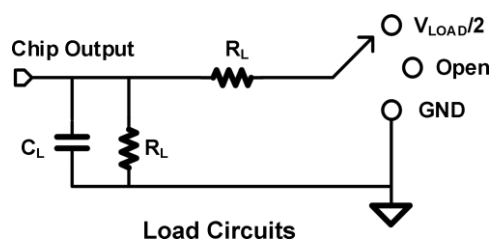


Fig.8-2. Typical Tpd vs Temp

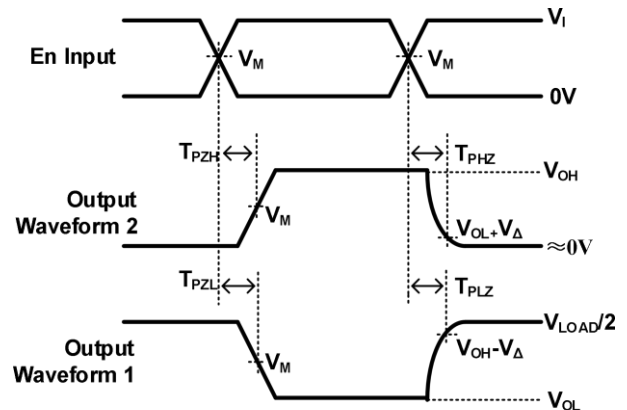
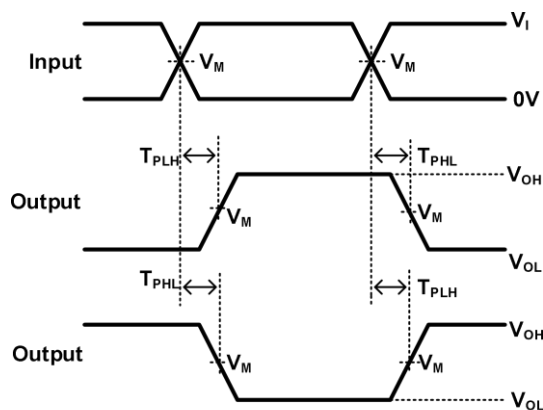
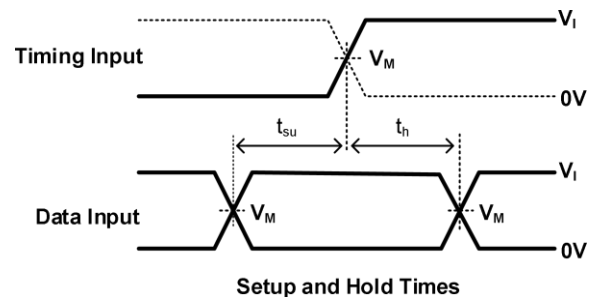
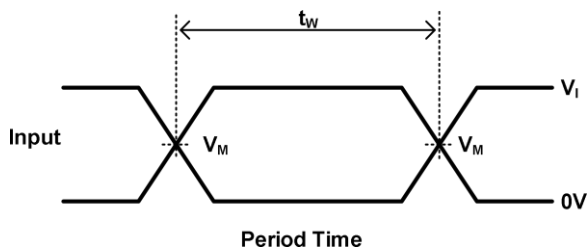
Parameter Measurement Information



TEST	S1
$T_{PHL}/T_{PLH}$	OPEN
$T_{PLZ}/T_{PZL}$	$V_{LOAD}$
$T_{PHZ}/T_{PZH}$	GND

Parameter Measurement Information(Continued)

$V_{CC}$	INPUTS		$V_M$	$V_{LOAD}$	$C_L$	$R_L$	$V_{\Delta}$
	$V_I$	$T_r/T_f$					
$1.8V \pm 0.15V$	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	1kΩ	0.15V
$2.5V \pm 0.15V$	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	500Ω	0.15V
$3.3V \pm 0.15V$	3V	$\leq 2.5ns$	1.5V	6V	50pF	500Ω	0.3V
$5V \pm 0.15V$	$V_{CC}$	$\leq 2.5ns$	$V_{CC}/2$	$2 \times V_{CC}$	50pF	500Ω	0.3V



Propagation Delay  
for Output and Inverted Output

Enable and Disable Times  
Low-And High-Level Enabling

Notes: A.  $C_L$  includes probe and jig capacitance.

B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control.

Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.

C. All input pulses are supplied by generators having the following characteristics: PRR 10 MHz,  $Z = 50$ .

D. The outputs are measured one at a time, with one transition per measurement.

E.  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .

F.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .

G.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .

H. All parameters and waveforms are not applicable to all device.

## Detailed Description

### Overview

This device is fully specified for partial-power-down applications using  $I_{off}$ . The  $I_{off}$  circuitry disables the outputs, preventing damaging current back flow through the device when it is powered down.

### Feature Description

The device is designed for 1.65V to 5.5V  $V_{CC}$  operation and it allows down voltage translation from 5V to 3.3V, or 3.3V to 1.8V. Input signals to this device can be driven above the supply voltage so long as they remain below the maximum input voltage value.  $I_{off}$  feature allows voltages on the inputs and outputs, when  $V_{CC}$  is 0 V.

### Device Functional Modes

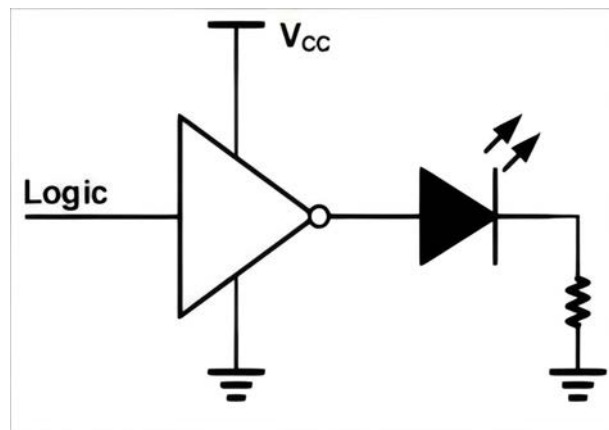
Input A	Output Y
H	L
L	H



## Application Information

The SN74LVC1G04 is a high drive CMOS device that can be used for implementing inversion logic with a high output drive, such as an LED application. It can produce 24mA of drive current at 3.3V making it Ideal for driving multiple outputs and good for high-speed applications up to 100Mhz. The inputs are 5.5V tolerant allowing it to translate down to Vcc.

## Typical Power Button Circuit

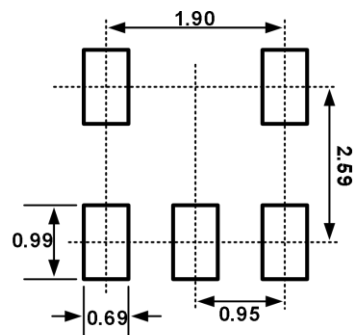
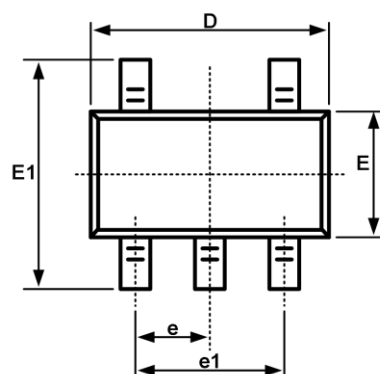


## Order information

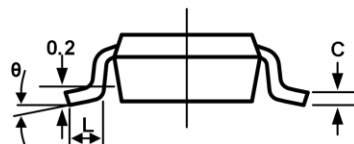
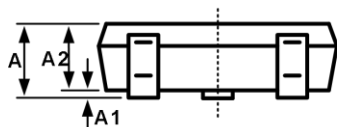
Package	Orderable Device	Packing Option
SOT-23-5L	SN74LVC1G04DBVR	3000/Reel
SC-70-5(SOT-353)	SN74LVC1G04DCKR	



Package Outline  
SOT-23-5L



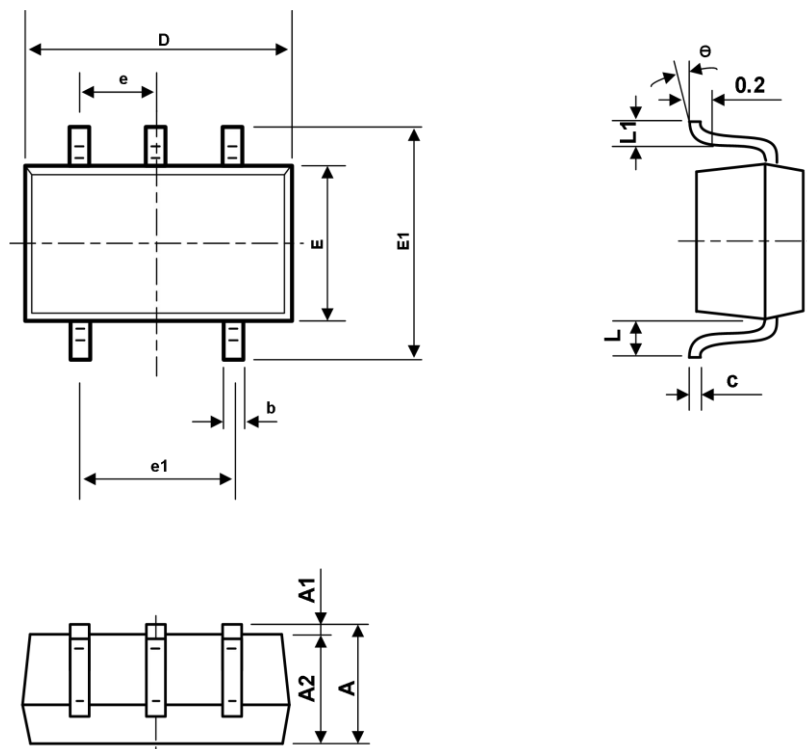
Recommended Land Pattern (Unit: mm)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950BSC		0.037BSC	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
L1	0.600REF		0.024REF	
θ	0°	8°	0°	8°



Package Outline  
SOT-353(SC-70-5)



symbol	Dimension In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.110	0.175	0.004	0.007
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650TYP		0.026TYP	
e1	1.200	1.400	0.047	0.055
L	0.525REF		0.021REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°





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