General Description

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

The HSN74LVC1G04 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 Vcc 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.

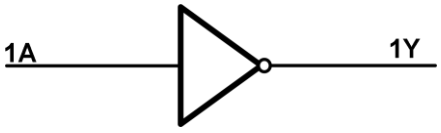
Features

- Low power consumption,10-μA max I_{CC}
- Supports 5V V_{CC} operation
- Inputs accept voltages to 5.5 V
- Max tpd of 3.3 ns at 3.3V
- ±24-mA output drive at 3.3V
- Ioff supports partial-power-down mode
- Typical V_{OHV} > 2V at V_{CC} = 3.3V, T_A = 25°C
- Typical V_{OLP} < 0.8V at V_{CC} = 3.3V, T_A = 25°C

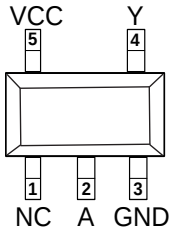
Applications

- 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/SO-70-5

Pin		Type	Description
Name	SOT-23-5L/SO-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			±50	mA
Continuous current through V_{CC} or GND				±100	mA
T_J	Junction temperature under bias			150	℃
T_{stg}	Storage temperature range		-65	150	℃

(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}=1.65V		-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	
T_A	Operating free-air temperature		-40	125	℃

ESD Ratings

ESD			Value	Unit
V(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	θ_{JA}	θ_{JC}	Unit
SOT-23-5L	250	81	°C/W
SC-70-5	400	150	°C/W

Electrical Characteristics

Vcc=5.0V or 3.3V, FULL=–40°C to +125°C, Typical values are at TA=+25°C. (unless otherwise noted)

Parameter		Test Conditions	V_{CC}	–40°C to 85°C			–40°C to 125°C			Unit
				Min	Typ	Max	Min	Typ	Max	
V_{OH}		I_{OH}=– 100 μA	1.65 V to 5.5 V	V_{CC}-0.1			V_{CC}-0.1			V
		I_{OH}=–4 mA	1.65 V	1.2			1.2			
		I_{OH}=–8 mA	2.3 V	1.9			1.9			
		I_{OH}=– 16 mA	3 V	2.4			2.4			
		I_{OH}=–24 mA		2.3			2.3			
		I_{OH}=–32 mA	4.5 V	3.8			3.8			
V_{OL}		I_{OL}=100 μA	1.65 V to 5.5 V			0.1			0.1	V
		I_{OL}=4 mA	1.65 V			0.45			0.45	
		I_{OL}=8 mA	2.3 V			0.3			0.3	
		I_{OL}=16 mA	3 V			0.4			0.4	
		I_{OL}=24 mA				0.55			0.55	
		I_{OL}=32 mA	4.5 V			0.55			0.55	
I_I	A input	V_I=5.5 V or GND	0 to 5.5 V			±5			±5	μA
I_{off}		V_I or V_O=5.5 V	0			±10			±10	μA
I_{CC}		V_I=5.5 V or GND, I_O=0	1.65 V to 5.5 V			10			10	μA
ΔI_{CC}		One input at V_{CC} – 0.6 V, Other inputs at V_{CC} or GND	3 V to 5.5 V			500			500	μA
C_i		V_I=V_{CC} or GND	3.3 V		5			5		pF

(1) All unused digital inputs of the device must be held at Vcc or GND to ensure proper device operation.

Vcc=5.0V or 3.3V, FULL=–40°C to +125°C, Typical values are at TA=+25°C. (unless otherwise noted)

Parameter	From (Input)	To (Output)	–40°C to 125°C								Unit
			V_{CC}=1.8 V ± 0.15 V		V_{CC}=2.5 V ± 0.2 V		V_{CC}=3.3 V ± 0.3 V		V_{CC}=5 V ± 0.5 V		
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pd}	A	Y	3.9	8.0	1.4	3.5	1	3.3	1	3.0	ns

T_A=25°C

Parameter		Test Conditions	V_{CC}=1.8 V	V_{CC}=2.5 V	V_{CC}=3.3 V	V_{CC}=5 V	Unit
			Typ	Typ	Typ	Typ	
C_{pd}	Power dissipation capacitance	f=10 MHz	17	18	25	30	pF

Typical Characteristics

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

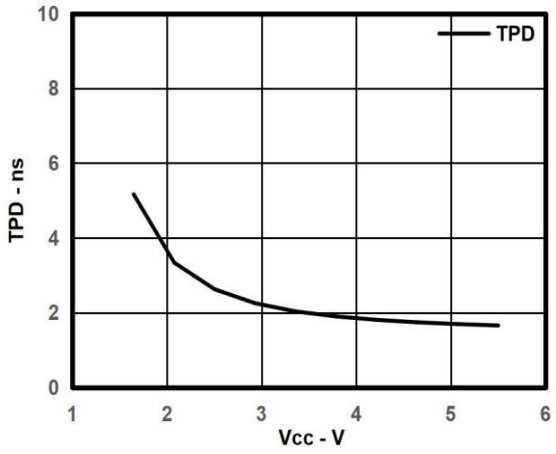


Fig.8-1. Typical Tpd vs Vcc

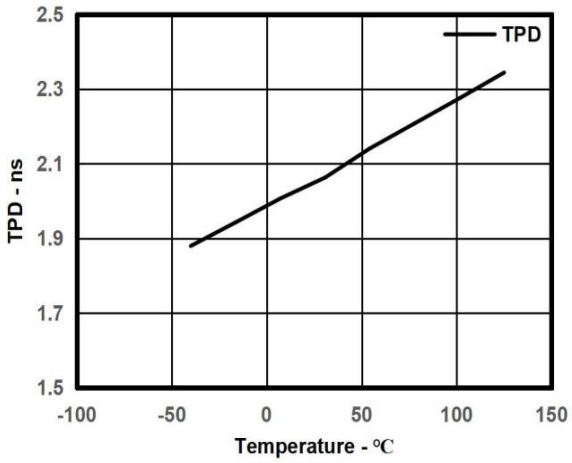
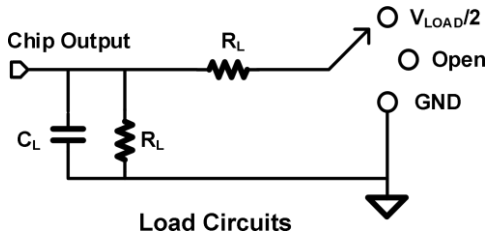


Fig.8-2. Typical Tpd vs Temp

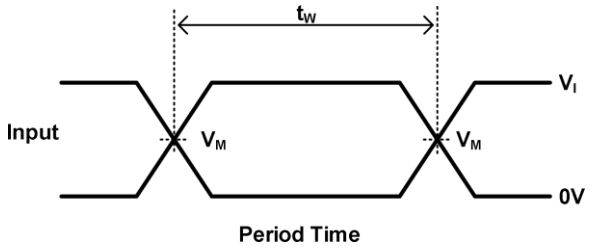
Parameter Measurement Information



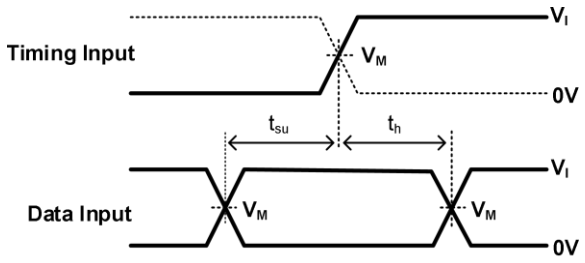
TEST	S1
T_{PHL}/T_{PLH}	OPEN
T_{PLZ}/T_{PZL}	V_{LOAD}
T_{PHZ}/T_{PZH}	GND

Parameter Measurement Information(Continued)

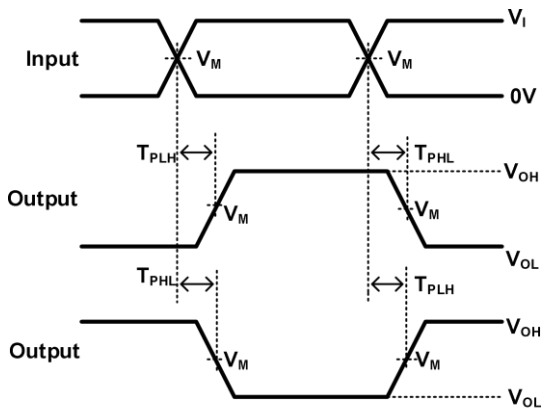
V_{CC}	INPUTS		V_M	V_{LOAD}	C_L	R_L	V_Δ
	V_I	T_r/T_f					
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	$2\times V_{CC}$	30pF	1kΩ	0.15V
2.5V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	$2\times V_{CC}$	30pF	500Ω	0.15V
3.3V±0.15V	3V	≤2.5ns	1.5V	6V	50pF	500Ω	0.3V
5V±0.15V	V_{CC}	≤2.5ns	$V_{CC}/2$	$2\times V_{CC}$	50pF	500Ω	0.3V



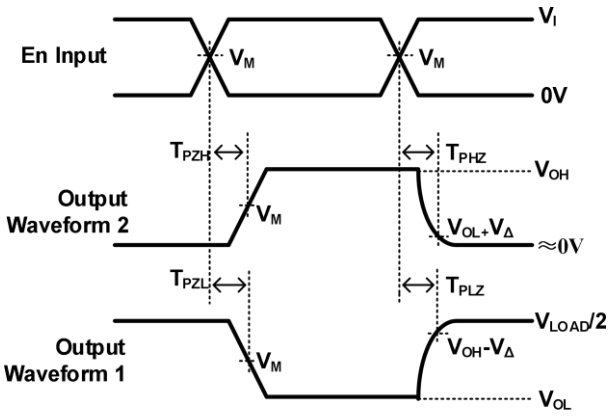
Period Time



Setup and Hold Times



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.

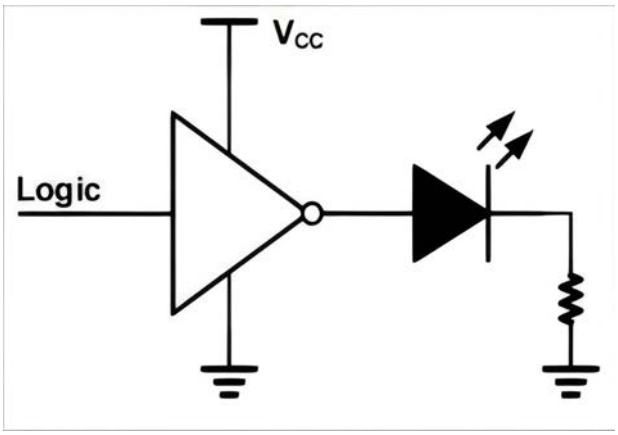
Device Functional Modes

Input A	Output Y
H	L
L	H

Application Information

The HSN74LVC1G04 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.

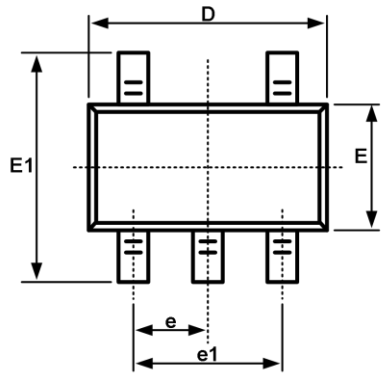
Typical Power Button Circuit

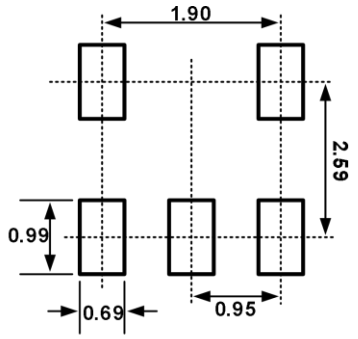


Order information

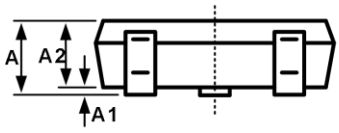
Package	Orderable Device	Packing Option
SOT-23-5L	HSN74LVC1G04DBVR	3000/Reel
SC-70-5(SOT-353)	HSN74LVC1G04DCKR	

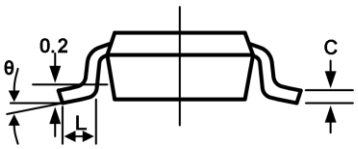
Package Outline
SOT-23-5L





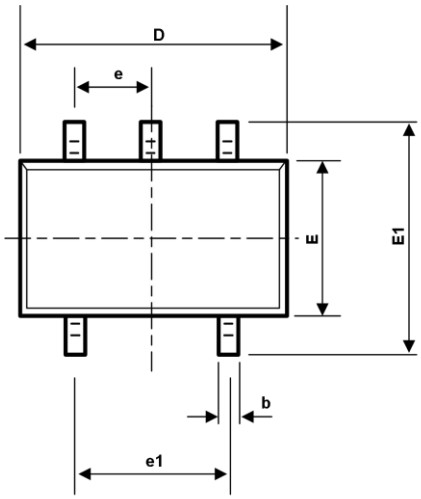
Recommended Land Pattern (Unit: mm)

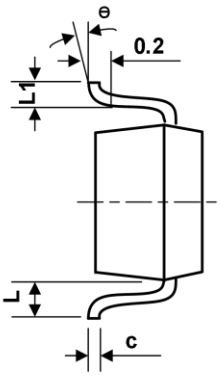


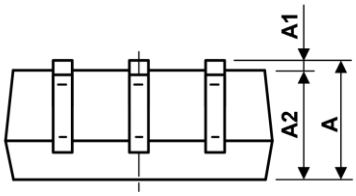


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950BSC		0.037BSC	
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
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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