



General Description

The operating voltage range of the SN74LVC2G14 single Schmitt-trigger buffer is 1.65 V to 5.5V.

The SN74LVC2G14 device contains two inverters and performs the Boolean function $Y=\overline{A}$. Because of the Schmitt-Trigger inputs, the device may have different input threshold levels for positive-going (V_{T+}) and negative-going (V_{T-}) signals, to provide hysteresis (ΔV_T) which makes the device tolerant to slow or noisy input signals.

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

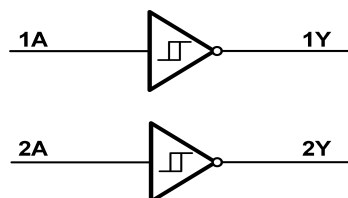
Features

- Schmitt-Trigger inputs provide hysteresis
- Supports 5V V_{CC} Operation
- Inputs Accept Voltages to 5.5V
- Max t_{pd} of 5.4ns at 3.3V
- ± 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 $V_{CC} = 3.3V$, $T_A = 25^\circ C$

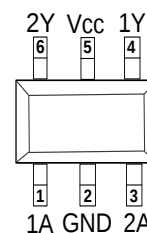
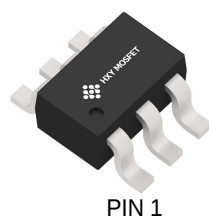
Applications

- AV Receivers
- Audio Docks: Portable
- Blu-ray Players and Home Theater
- MP3 Players/Recorders
- Personal Digital Assistants (PDAs)
- Power: Telecom/Server AC/DC Supply
- Solid State Drives (SSDs): Client and Enterprise
- TVs: LCD/Digital and High-Definition (HDTVs)
- Tablets: Enterprise
- Wireless Headsets, Keyboards, and Mice

Functional Block Diagram



Pinning and Pin Functions



SOT-23-6L/SC-70-6

Pin		Type	Description
Name	SOT-23-6L/SC-70-6		
1A	1	I	Input 1
GND	2	—	Ground
2A	3	I	Input 2
2Y	4	O	Output 2
V _{CC}	5	—	Positive Supply
1Y	6	O	Output 1



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<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	°C
T _{stg}	Storage temperature range		-65	150	°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.

ESD Ratings

ESD			Value	Unit
$V(\text{ESD})$	Electrostatic discharge	Human-body model (HBM)	4 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.

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	$^{\circ}\text{C}$



Thermal Information

Package Type	θ_{JA}	θ_{JC}	Unit
SOT-23-6L	250	81	°C/W
SC-70-6	400	150	°C/W

Electrical Characteristics

V_{CC}=5.0V or 3.3V, FULL=-40°C to +125°C, Typical values are at T_A=+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 _{T+} Positive-going input threshold voltage		1.65 V	0.7		1.4	0.7		1.4	V
		2.3 V	1.0		1.7	1.0		1.7	
		3 V	1.3		2.0	1.3		2.0	
		4.5 V	1.9		3.1	1.9		3.1	
		5.5 V	2.2		3.7	2.2		3.7	
V _{T-} Negative-going input threshold voltage		1.65 V	0.25		0.7	0.25		0.7	V
		2.3 V	0.4		1	0.4		1.0	
		3 V	0.8		1.3	0.8		1.3	
		4.5 V	1.1		2	1.1		2.0	
		5.5 V	1.4		2.5	1.4		2.5	
ΔV_T Hysteresis (V _{T+} - V _{T-})		1.65 V	0.3		1	0.3		1	V
		2.3 V	0.4		1	0.4		1	
		3 V	0.5		1	0.5		1	
		4.5 V	0.6		1	0.6		1	
		5.5 V	0.7		1.1	0.7		1.1	
V _{OH}	I _{OH} =-100 μ A	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 μ A	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	μ A
I _{off}		V _I or V _O =5.5 V	0		± 10			± 10	μ A
I _{CC}		V _I =5.5 V or GND, I _O =0	1.65 V to 5.5 V		10			10	μ A
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	μ A
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 V_{CC} or GND to ensure proper device operation.



Electrical Characteristics

V_{CC}=5.0V or 3.3V, Typical values are at T_A=+25°C. (unless otherwise noted)

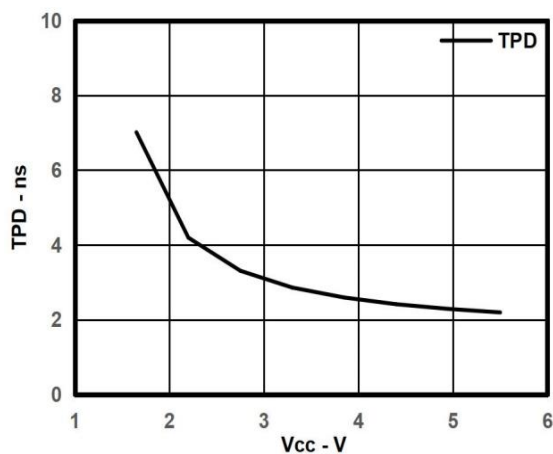
Parameter	From (Input)	To (Output)	−40°C to 125°C								Unit
			V _{CC} =1.8 V ± 0.15 V		V _{CC} =2.5 V ± 0.2 V		V _{CC} =3.3 V ± 0.3 V		V _{CC} =5 V ± 0.5 V		
			Min	Max	Min	Max	Min	Max	Min	Max	
t _{pd}	A	Y	3.9	13.0	1.9	5.0	2.2	4.5	1.5	4.2	ns

T_A=25°C

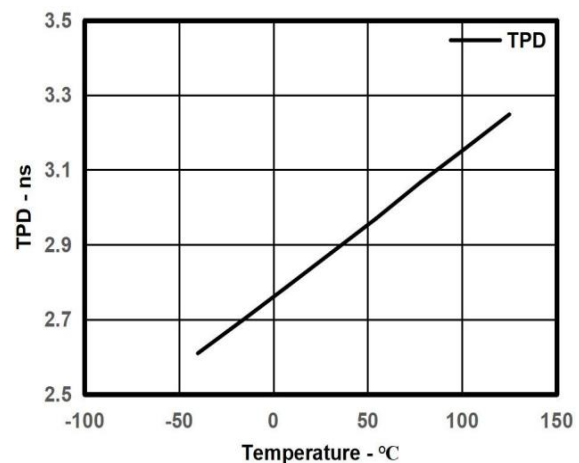
Parameter		Test Conditions	V _{CC} =1.8 V	V _{CC} =2.5 V	V _{CC} =3.3 V	V _{CC} =5 V	Unit
			Typ	Typ	Typ	Typ	
C _{pd}	Power dissipation capacitance	f=10 MHz	20	25	30	50	pF

Typical Characteristics

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

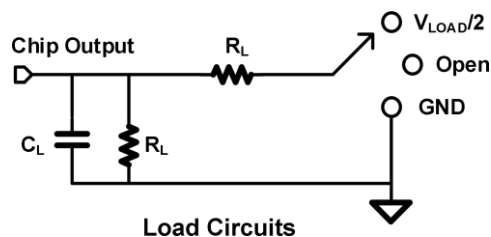


Typical Tpd vs Vcc



Typical Tpd vs Temp

Parameter Measurement Information

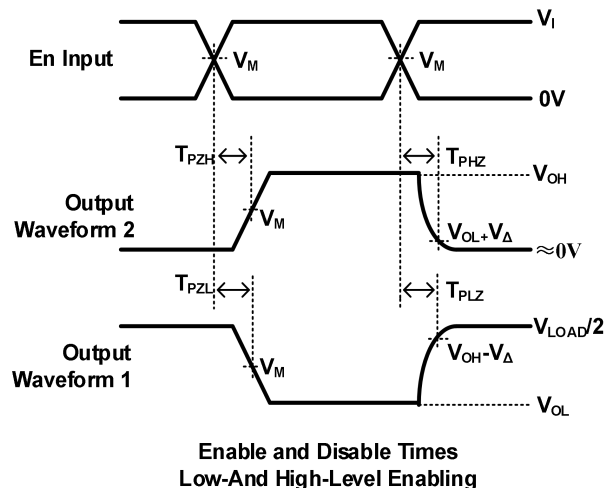
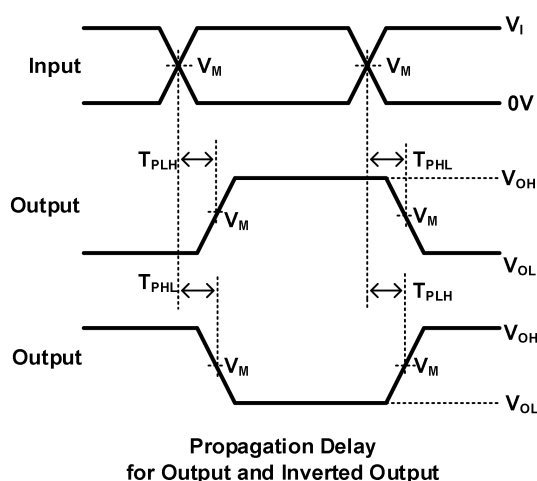
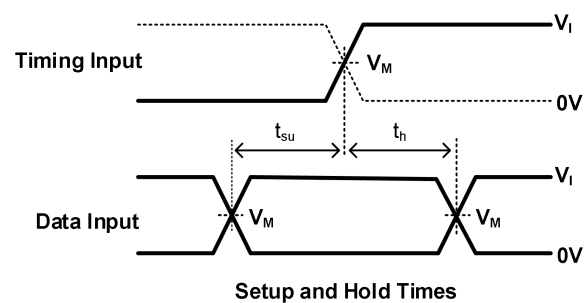
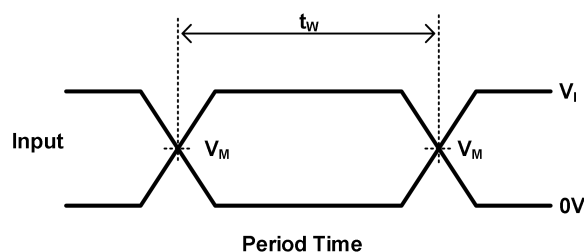


TEST	S1
T _{PHL} /T _{PLH}	OPEN
T _{PLZ} /T _{PZL}	V _{LOAD}
T _{PHZ} /T _{PZH}	GND



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



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.

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.

The SN74LVC2G14 has power-down protection (I_{off}) and schmitt-trigger input.

The inputs and outputs for this device enter a high impedance state when the supply voltage is 0 V. The maximum leakage into or out of any input or output pin on the device is specified by I_{off} in the Electrical Characteristics.

The Schmitt-Trigger input makes this device extremely tolerant to slow or noisy inputs. While the inputs can be driven much slower than standard CMOS inputs, it is still recommended to properly terminate unused inputs. Driving the inputs slowly will also increase dynamic current consumption of the device.

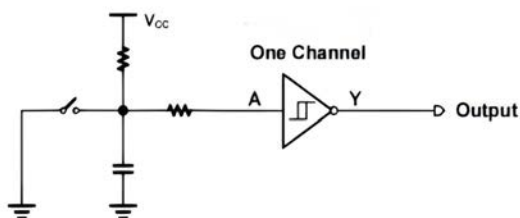
Device Functional Modes

Input A	Output Y
H	L
L	H

Application Information

Mechanical input elements, such as push buttons or rotary knobs, offer simple ways to interact with electronic systems. Typically, these elements have recoil or bouncing, where the mechanical element makes and breaks contact multiple times during human interaction. This bouncing can cause one or more repeated signals to be passed, triggering multiple actions when only a single input was intended. One potential solution to mitigating these multiple inputs is by utilizing a Schmitt-trigger to create a debounce circuit.

Typical Power Button Circuit

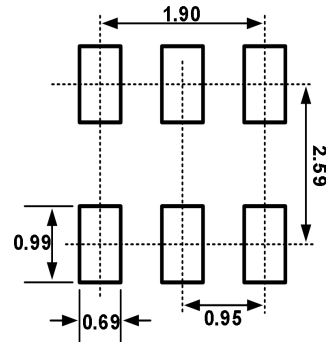
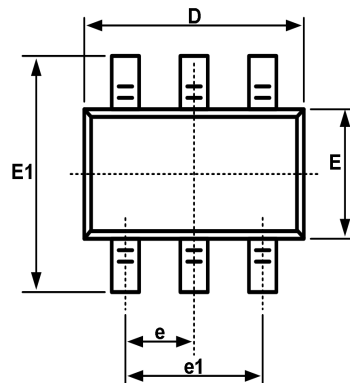


Order information

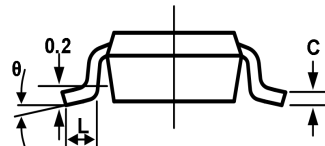
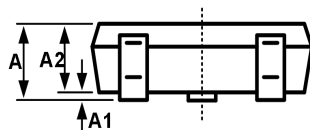
Package	Orderable Device	Packing Option
SOT23-6	SN74LVC2G14DBVR	3000/Reel
SC70-6	SN74LVC2G14DCKR	



Package Outline
SOT-23-6L



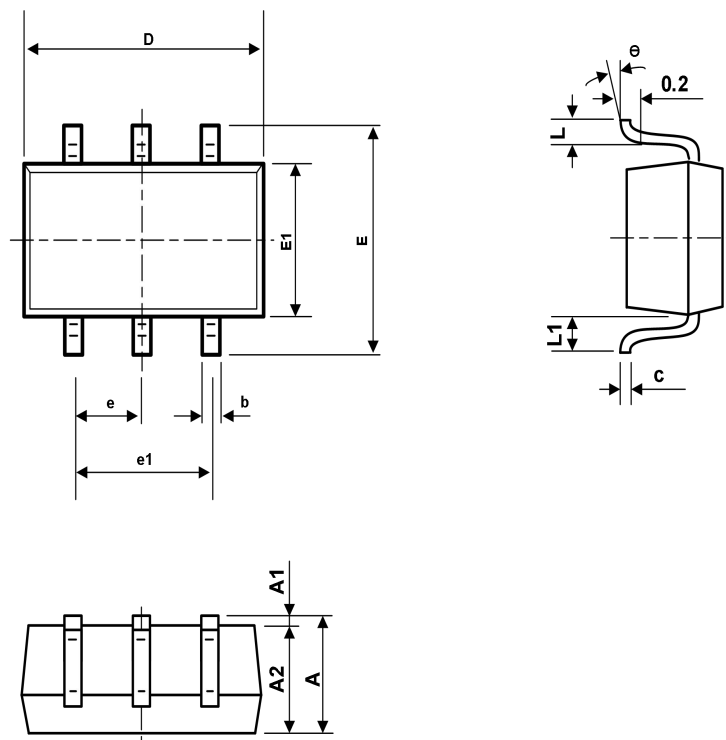
Recommended Land Pattern (Unit: mm)



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
θ	0°	8°	0°	8°



Package Outline
SC-70-6



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	2.150	2.450	0.085	0.096
E1	1.150	1.350	0.045	0.053
e	0.650TYP		0.026TYP	
e1	1.200	1.400	0.047	0.055
L	0.260	0.460	0.010	0.018
L1	0.525REF		0.021REF	
θ	0°	8°	0°	8°



Attention

- Any and all HUA XUAN YANG ELECTRONICS products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your HUA XUAN YANG ELECTRONICS representative nearest you before using any HUA XUAN YANG ELECTRONICS products described or contained herein in such applications.
- HUA XUAN YANG ELECTRONICS assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all HUA XUAN YANG ELECTRONICS products described or contained herein.
- Specifications of any and all HUA XUAN YANG ELECTRONICS products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- HUA XUAN YANG ELECTRONICS CO.,LTD. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all HUA XUAN YANG ELECTRONICS products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of HUA XUAN YANG ELECTRONICS CO.,LTD.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. HUA XUAN YANG ELECTRONICS believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the HUA XUAN YANG ELECTRONICS product that you intend to use.