

# SN74LV05A Hex Inverters With Open-Drain Outputs

## 1 Features

- $V_{CC}$  operation of 2 V to 5.5 V
- Typical  $V_{OLP}$  (output ground bounce)  $< 0.8$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- Typical  $V_{OHV}$  (output  $V_{OH}$  undershoot)  $> 2.3$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- Support mixed-mode voltage operation on all ports
- $I_{off}$  supports partial-power-down mode operation
- Latch-up performance exceeds 250 mA per JESD 17

## 2 Applications

- Electronic points of sale
- I/O modules: digital PLC/DCS inputs
- Motor drives and controls
- Servers
- Network switches
- Tests and measurements

## 3 Description

The SN74LV05A device contains six independent inverters designed for 2 V to 5.5 V  $V_{CC}$  operation.

This device performs the Boolean function  $Y = \bar{A}$ .

### Package Information<sup>(1)</sup>

PART NUMBER	PACKAGE	BODY SIZE (NOM)
SN74LV05A	DGV (TVSOP, 14)	3.60 mm × 4.40 mm
	D (SOIC, 14)	8.65 mm × 3.91 mm
	NS (SO, 14)	10.30 mm × 5.30 mm
	PW (TSSOP, 14)	5.00 mm × 4.40 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.



Simplified Schematic



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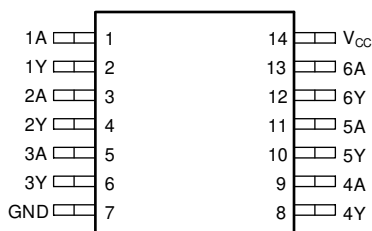
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## 4 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

<b>Changes from Revision J (December 2014) to Revision K (March 2023)</b>	<b>Page</b>
<ul style="list-style-type: none"> <li>Updated the format of tables, figures, and cross-references throughout the document and removed references to DB package.....</li> </ul>	<b>1</b>
<b>Changes from Revision I (April 2005) to Revision J (December 2014)</b>	<b>Page</b>
<ul style="list-style-type: none"> <li>Added <i>Applications</i>, <i>Device Information</i> table, <i>Pin Functions</i> table, <i>ESD Ratings</i> table, <i>Thermal Information</i> table, <i>Typical Characteristics</i>, <i>Feature Description</i> section, <i>Device Functional Modes</i>, <i>Application and Implementation</i> section, <i>Power Supply Recommendations</i> section, <i>Layout</i> section, <i>Device and Documentation Support</i> section, and <i>Mechanical, Packaging, and Orderable Information</i> section.....</li> <li>Deleted <i>Ordering Information</i> table.....</li> <li>MAX operating temperature to 125°C in <i>Recommended Operating Conditions</i> table.....</li> </ul>	<b>1</b> <b>1</b> <b>5</b>

## 5 Pin Configuration and Functions



**Figure 5-1. D, DGV, NS, or PW Package (Top View)**

**Table 5-1. Pin Functions**

PIN		TYPE <sup>(1)</sup>	DESCRIPTION
NO.	NAME		
1	1A	I	1A Input
2	1Y	O	1Y Output
3	2A	I	2A Input
4	2Y	O	2Y Output
5	3A	I	3A Input
6	3Y	O	3Y Output
7	GND	—	Ground Pin
8	4Y	O	4Y Output
9	4A	I	4A Input
10	5Y	O	5Y Output
11	5A	I	5A Input
12	6Y	O	6Y Output
13	6A	I	6A Input
14	V <sub>CC</sub>	—	Power Pin

(1) Signal Types: I = Input, O = Output, I/O = Input or Output.

## 6 Specifications

### 6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)<sup>(1)</sup>

		MIN	MAX	UNIT
$V_{CC}$	Supply voltage range	–0.5	7	V
$V_I$	Input voltage range <sup>(2)</sup>	–0.5	7	V
$V_O$	Voltage range applied to any output in the high-impedance or power-off state <sup>(2)</sup>	–0.5	7	V
$V_O$	Output voltage range <sup>(2) (3)</sup>	–0.5	$V_{CC} + 0.5$	V
$I_{IK}$	Input clamp current	$V_I < 0$		–20 mA
$I_{OK}$	Output clamp current	$V_O < 0$		–50 mA
$I_O$	Continuous output current	$V_O = 0$ to $V_{CC}$		±25 mA
	Continuous current through $V_{CC}$ or GND			±50 mA
$T_J$	Junction temperature			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 [Section 6.3](#) is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.
- (3) This value is limited to 5.5-V maximum.

### 6.2 ESD Ratings

		VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge		
	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins <sup>(1)</sup>	2500	V
	Charged device model (CDM), per JEDEC specification JESD22-C101, all pins <sup>(2)</sup>	2000	

- (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.

## 6.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)<sup>(1)</sup>

			MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage		2	5.5	V
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 2 V	1.5		V
		V <sub>CC</sub> = 2.3 V to 2.7 V	V <sub>CC</sub> × 0.7		
		V <sub>CC</sub> = 3 V to 3.6 V	V <sub>CC</sub> × 0.7		
		V <sub>CC</sub> = 4.5 V to 5.5 V	V <sub>CC</sub> × 0.7		
V <sub>IL</sub>	Low-level input voltage	V <sub>CC</sub> = 2 V		0.5	V
		V <sub>CC</sub> = 2.3 V to 2.7 V		V <sub>CC</sub> × 0.3	
		V <sub>CC</sub> = 3 V to 3.6 V		V <sub>CC</sub> × 0.3	
		V <sub>CC</sub> = 4.5 V to 5.5 V		V <sub>CC</sub> × 0.3	
V <sub>I</sub>	Input voltage		0	5.5	V
V <sub>O</sub>	Output voltage		0	5.5	V
I <sub>OL</sub>	Low-level output current	V <sub>CC</sub> = 2 V		50	μA
		V <sub>CC</sub> = 2.3 V to 2.7 V		2	
		V <sub>CC</sub> = 3 V to 3.6 V		6	
		V <sub>CC</sub> = 4.5 V to 5.5 V		12	
Δt/Δv	Input transition rise or fall rate	V <sub>CC</sub> = 2.3 V to 2.7 V		200	ns/V
		V <sub>CC</sub> = 3 V to 3.6 V		100	
		V <sub>CC</sub> = 4.5 V to 5.5 V		20	
T <sub>A</sub>	Operating free-air temperature		–40	125	°C

(1) All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs* (SCBA004).

## 6.4 Thermal Information

THERMAL METRIC <sup>(1)</sup>		SN74LV05A				UNIT
		D	DGV	NS	PW	
		14 PINS				
R <sub>θJA</sub>	Junction-to-ambient thermal resistance	94.9	130.4	91.4	122.6	°C/W
R <sub>θJC(top)</sub>	Junction-to-case (top) thermal resistance	56.3	53.4	49.0	51.3	
R <sub>θJB</sub>	Junction-to-board thermal resistance	49.2	63.5	50.2	64.4	
Ψ <sub>JT</sub>	Junction-to-top characterization parameter	20.7	7.3	15.3	6.8	
Ψ <sub>JB</sub>	Junction-to-board characterization parameter	48.9	62.8	49.8	63.8	

(1) For more information about traditional and new thermal metrics, see the *IC Package Thermal Metrics* application report (SPRA953).

## 6.5 Electrical Characteristics

over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = 25°C			–40°C to 85°C		–40°C to 125°C		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V <sub>OL</sub>	Low-level output voltage	I <sub>OL</sub> = 50 μA	2 V to 5.5 V		0.1		0.1		0.1	V
		I <sub>OL</sub> = 2 mA	2.3 V		0.4		0.4		0.4	
		I <sub>OL</sub> = 6 mA	3 V		0.44		0.44		0.44	
		I <sub>OL</sub> = 12 mA	4.5 V		0.55		0.55		0.6	
I <sub>I</sub>	Input leakage current	V <sub>I</sub> = 5.5 V or GND	0 to 5.5 V		±1		±1		±1	μA

## 6.5 Electrical Characteristics (continued)

over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = 25°C			–40°C to 85°C		–40°C to 125°C		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
I <sub>CC</sub>	Static supply current	V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0	5.5		20		20		20	μA
I <sub>off</sub>	Input/Output PowerOff Leakage Current	V <sub>I</sub> or V <sub>O</sub> = 0 to 5.5 V	0		5		5		5	μA
C <sub>i</sub>	Input capacitance V	V <sub>I</sub> = V <sub>CC</sub> or GND	3.3 V		2.5					pF

## 6.6 Switching Characteristics, V<sub>CC</sub> = 2.5 V ± 0.2 V

over recommended operating free-air temperature range (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T <sub>A</sub> = 25°C			–40°C to 85°C		–40°C to 125°C		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A	Y	C <sub>L</sub> = 15 pF	3.6 <sup>(1)</sup>	10.4 <sup>(1)</sup>		1	13	1	13.5	ns
t <sub>PHL</sub>				5.8 <sup>(1)</sup>	12.2 <sup>(1)</sup>		1	15	1	16.5	
t <sub>PLH</sub>	A	Y	C <sub>L</sub> = 50 pF	6.1	15.2		1	18	1	18.5	ns
t <sub>PHL</sub>				8.1	16.6		1	19.5	1	21	

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested.

## 6.7 Switching Characteristics, V<sub>CC</sub> = 3.3 V ± 0.3 V

over recommended operating free-air temperature range (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T <sub>A</sub> = 25°C			–40°C to 85°C		–40°C to 125°C		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A	Y	C <sub>L</sub> = 15 pF	2.9 <sup>(1)</sup>	7.1 <sup>(1)</sup>		1	8.5	1	9	ns
t <sub>PHL</sub>				4 <sup>(1)</sup>	7.1 <sup>(1)</sup>		1	8.5	1	9.5	
t <sub>PLH</sub>	A	Y	C <sub>L</sub> = 50 pF	4.7	10.6		1	12	1	12.5	ns
t <sub>PHL</sub>				5.8	10.6		1	12	1	13	

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested.

## 6.8 Switching Characteristics, V<sub>CC</sub> = 5 V ± 0.5 V

over recommended operating free-air temperature range (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T <sub>A</sub> = 25°C			–40°C to 85°C		–40°C to 125°C		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A	Y	C <sub>L</sub> = 15 pF	2.2 <sup>(1)</sup>	5.5 <sup>(1)</sup>		1	6.5	1	7	ns
t <sub>PHL</sub>				2.9 <sup>(1)</sup>	5.5 <sup>(1)</sup>		1	6.5	1	7.5	
t <sub>PLH</sub>	A	Y	C <sub>L</sub> = 50 pF	3.4	7.5		1	8.5	1	9	ns
t <sub>PHL</sub>				4.2	7.5		1	8.5	1	9.5	

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested.

## 6.9 Noise Characteristics

V<sub>CC</sub> = 3.3 V, C<sub>L</sub> = 50 pF, T<sub>A</sub> = 25°C

PARAMETER		SN74LV05A			UNIT
		MIN	TYP	MAX	
V <sub>OL(P)</sub>	Quiet output, maximum dynamic V <sub>OL</sub>		0.55	0.8	V
V <sub>OL(V)</sub>	Quiet output, minimum dynamic V <sub>OL</sub>		–0.04	–0.8	V
V <sub>OH(V)</sub>	Quiet output, minimum dynamic V <sub>OH</sub>		3.12		V
V <sub>IH(D)</sub>	High-level dynamic input voltage	2.31			V

$V_{CC} = 3.3\text{ V}$ ,  $C_L = 50\text{ pF}$ ,  $T_A = 25^\circ\text{C}$

PARAMETER	SN74LV05A			UNIT
	MIN	TYP	MAX	
$V_{IL(D)}$ Low-level dynamic input voltage			0.97	V

## 6.10 Operating Characteristics

$T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	$V_{CC}$	TYP	UNIT
$C_{pd}$ Power dissipation capacitance	$C_L = 50\text{ pF}$ $f = 10\text{ MHz}$	3.3 V	2.5	pF
		5 V	3	

## 6.11 Typical Characteristics

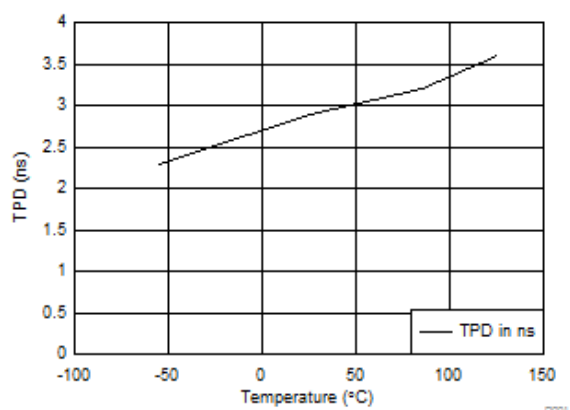


Figure 6-1. TPD vs Temperature

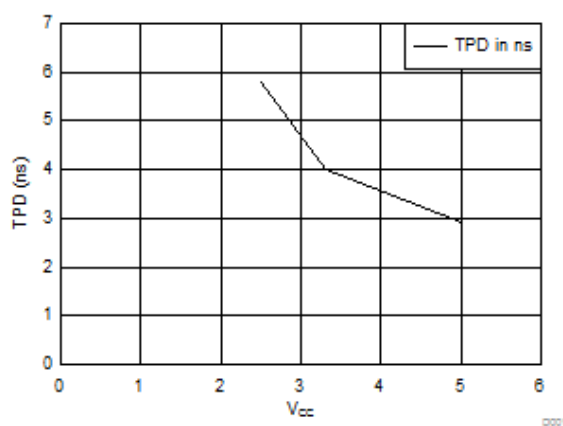
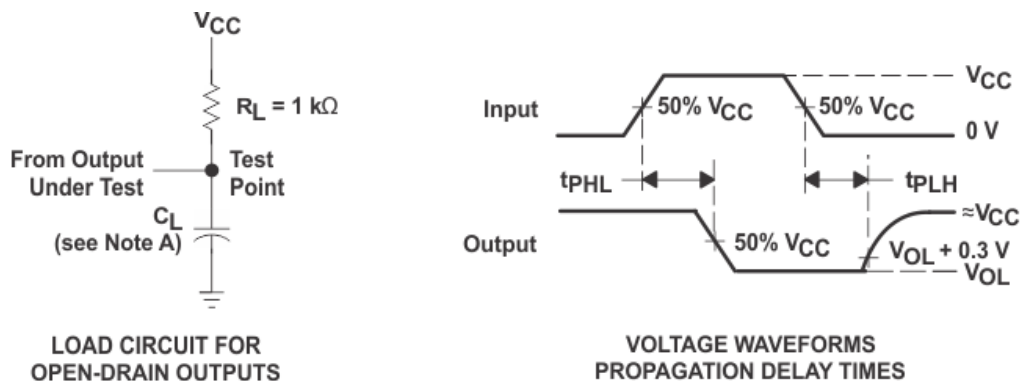


Figure 6-2. TPD vs  $V_{CC}$  at  $25^\circ\text{C}$

## 7 Parameter Measurement Information



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 3 \text{ ns}$ ,  $t_f \leq 3 \text{ ns}$ .  
 C. The outputs are measured one at a time, with one input transition per measurement.

**Figure 7-1. Load Circuit and Voltage Waveforms**



## 8 Detailed Description

### 8.1 Overview

The SN74LV05A device contains six independent inverters designed for 2-V to 5.5-V  $V_{CC}$  operation.

This device performs the Boolean function  $Y = \bar{A}$ .

The open-drain outputs require pull-up resistors to perform correctly and can be connected to other open-drain outputs to implement active-low, wired-OR or active-high wired-AND functions.

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.

### 8.2 Functional Block Diagram



Figure 8-1. Logic Diagram (Positive Logic)

### 8.3 Feature Description

- Wide operating voltage range
  - Operates from 2 V to 5.5 V
- Allows down-voltage translation
  - Inputs accept voltages to 5.5 V
- $I_{off}$  feature
  - Allows voltages on the inputs and outputs when  $V_{CC}$  is 0 V

### 8.4 Device Functional Modes

**Table 8-1. Function Table  
(Each Inverter)**

INPUT <sup>(1)</sup> A	OUTPUT <sup>(2)</sup> Y
H	L
L	H

- (1) H = High Voltage Level, L = Low Voltage Level, X = Don't Care
- (2) H = Driving High, L = Driving Low, Z = High Impedance State

## 9 Application and Implementation

### Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes, as well as validating and testing their design implementation to confirm system functionality.

### 9.1 Application Information

SN74LV05A is a low-drive, open-drain CMOS device that can be used for a multitude of buffer type functions. The inputs are 5.5-V tolerant and the outputs are open-drain and 5.5-V tolerant, allowing it to translate up to 5.5 V or down to any other voltage between GND and 5.5 V.

### 9.2 Typical Application

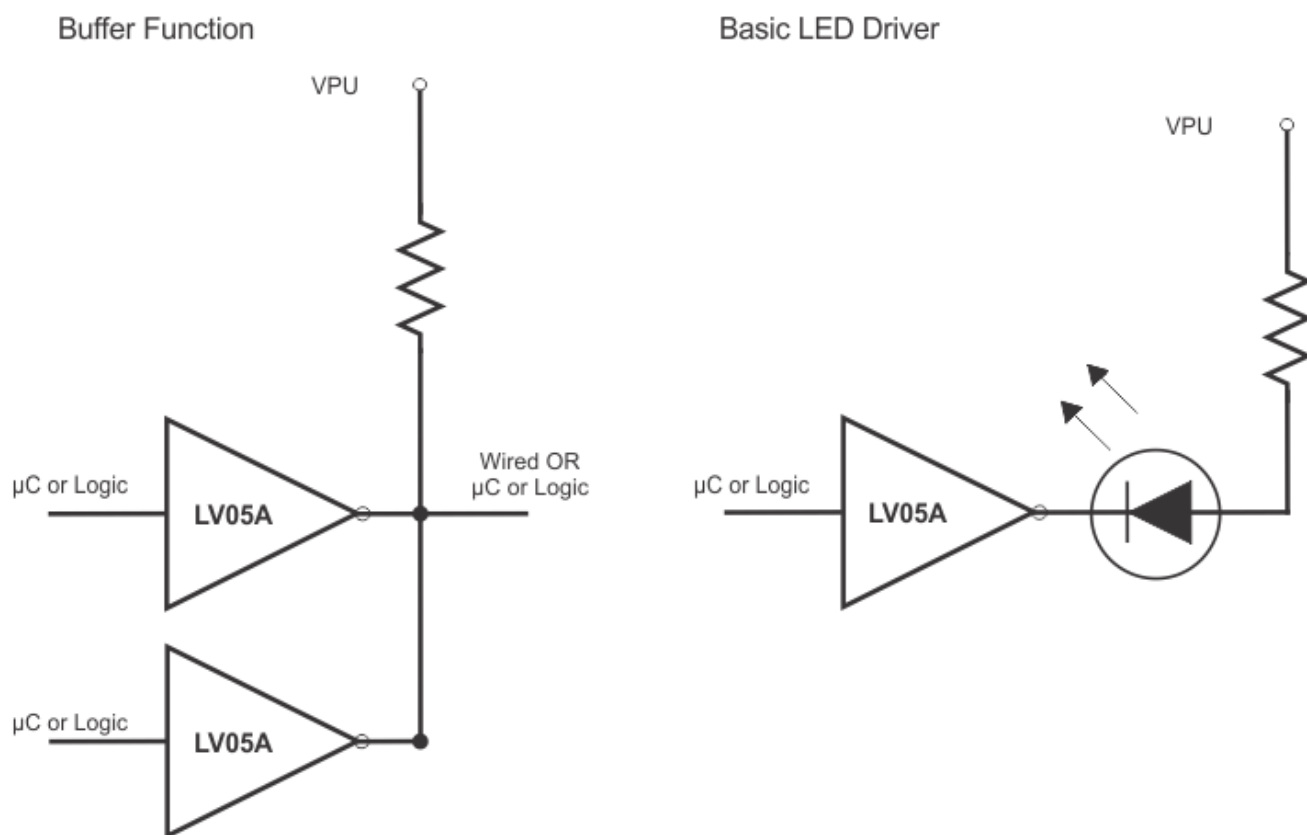


Figure 9-1. Typical Application Schematic

#### 9.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Care should be taken to avoid bus contention because it can drive currents that would exceed maximum limits. The high drive will also create fast edges into light loads, so routing and load conditions should be considered to prevent ringing.

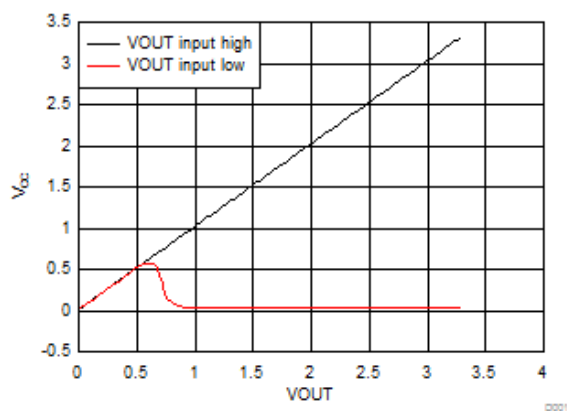
#### 9.2.2 Detailed Design Procedure

##### 1. Recommended Input Conditions

- For rise time and fall time specifications, see  $\Delta t/\Delta V$  in the [Section 6.3](#) table.
- For specified High and low levels, see  $V_{IH}$  and  $V_{IL}$  in the [Section 6.3](#) table.

- Inputs are overvoltage tolerant allowing them to go as high as 5.5 V at any valid  $V_{CC}$ .
2. Recommend Output Conditions
- Load currents should not exceed 35 mA per output and 50 mA total for the part.

### 9.2.3 Application Curves



**Figure 9-2. Output at Power Up with 4k Pull-Up 3.3 V**

### 9.3 Power Supply Recommendations

The power supply can be any voltage between the MIN and MAX supply voltage rating located in the [Section 6.3](#) table.

Each  $V_{CC}$  pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1  $\mu\text{F}$  is recommended. If there are multiple  $V_{CC}$  pins, 0.01  $\mu\text{F}$  or 0.022  $\mu\text{F}$  is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A 0.1  $\mu\text{F}$  and 1  $\mu\text{F}$  are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.

### 9.4 Layout

#### 9.4.1 Layout Guidelines

When using multiple bit logic devices, inputs should not float. In many cases, functions or parts of functions of digital logic devices are unused. Some examples are when only two inputs of a triple-input AND gate are used, or when only 3 of the 4-buffer gates are used. Such input pins should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states.

Specified in [Figure 9-3](#) are rules that must be observed under all circumstances. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that should be applied to any particular unused input depends on the function of the device. Generally they will be tied to GND or  $V_{CC}$ , whichever makes more sense or is more convenient. It is acceptable to float outputs unless the part is a transceiver.

#### 9.4.2 Layout Example

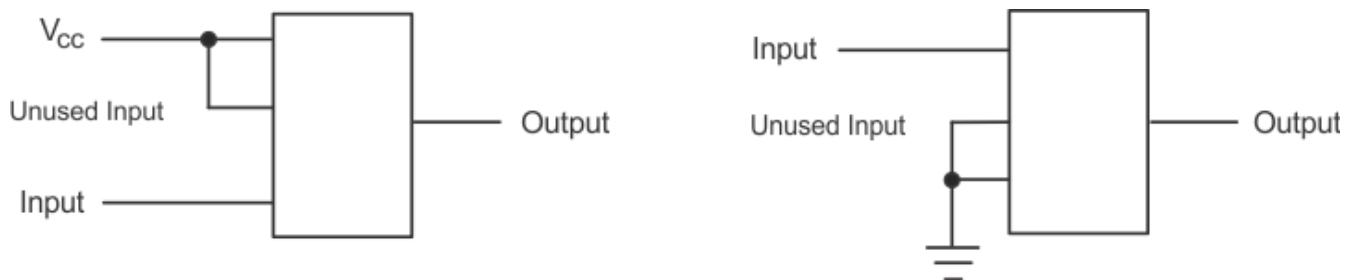


Figure 9-3. Layout Diagram

## 10 Device and Documentation Support

### 10.1 Documentation Support

#### 10.1.1 Related Documentation

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

**Table 10-1. Related Links**

PARTS	PRODUCT FOLDER	SAMPLE & BUY	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
SN74LV05A	<a href="#">Click here</a>	<a href="#">Click here</a>	<a href="#">Click here</a>	<a href="#">Click here</a>	<a href="#">Click here</a>

### 10.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](http://ti.com). Click on *Subscribe to updates* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

### 10.3 Support Resources

[TI E2E™ support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

### 10.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.

All trademarks are the property of their respective owners.

### 10.5 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

### 10.6 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

## 11 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

## PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package   Pins	Package qty   Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
<a href="#">SN74LV05AD</a>	Obsolete	Production	SOIC (D)   14	-	-	Call TI	Call TI	-40 to 125	LV05A
<a href="#">SN74LV05ADGVR</a>	Active	Production	TVSOP (DGV)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	LV05A
SN74LV05ADGVR.A	Active	Production	TVSOP (DGV)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	LV05A
<a href="#">SN74LV05ADR</a>	Active	Production	SOIC (D)   14	2500   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	LV05A
SN74LV05ADR.A	Active	Production	SOIC (D)   14	2500   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	LV05A
SN74LV05ADR.B	Active	Production	SOIC (D)   14	2500   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	LV05A
<a href="#">SN74LV05ANSR</a>	Active	Production	SOP (NS)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	74LV05A
SN74LV05ANSR.A	Active	Production	SOP (NS)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	74LV05A
<a href="#">SN74LV05APW</a>	Obsolete	Production	TSSOP (PW)   14	-	-	Call TI	Call TI	-40 to 125	LV05A
<a href="#">SN74LV05APWR</a>	Active	Production	TSSOP (PW)   14	2000   LARGE T&R	Yes	NIPDAU   SN	Level-1-260C-UNLIM	-40 to 125	(L05A, LV05A)
SN74LV05APWR.A	Active	Production	TSSOP (PW)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	(L05A, LV05A)
SN74LV05APWR.B	Active	Production	TSSOP (PW)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	(L05A, LV05A)
<a href="#">SN74LV05APWRG4</a>	Active	Production	TSSOP (PW)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	LV05A
<a href="#">SN74LV05APWT</a>	Obsolete	Production	TSSOP (PW)   14	-	-	Call TI	Call TI	-40 to 125	LV05A

(1) **Status:** For more details on status, see our [product life cycle](#).

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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## TAPE AND REEL INFORMATION



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LV05ADGVR	TVSOP	DGV	14	2000	330.0	12.4	6.8	4.0	1.6	8.0	12.0	Q1
SN74LV05ADR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74LV05ANSR	SOP	NS	14	2000	330.0	16.4	8.1	10.4	2.5	12.0	16.0	Q1
SN74LV05APWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74LV05APWRG4	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1



## TAPE AND REEL BOX DIMENSIONS

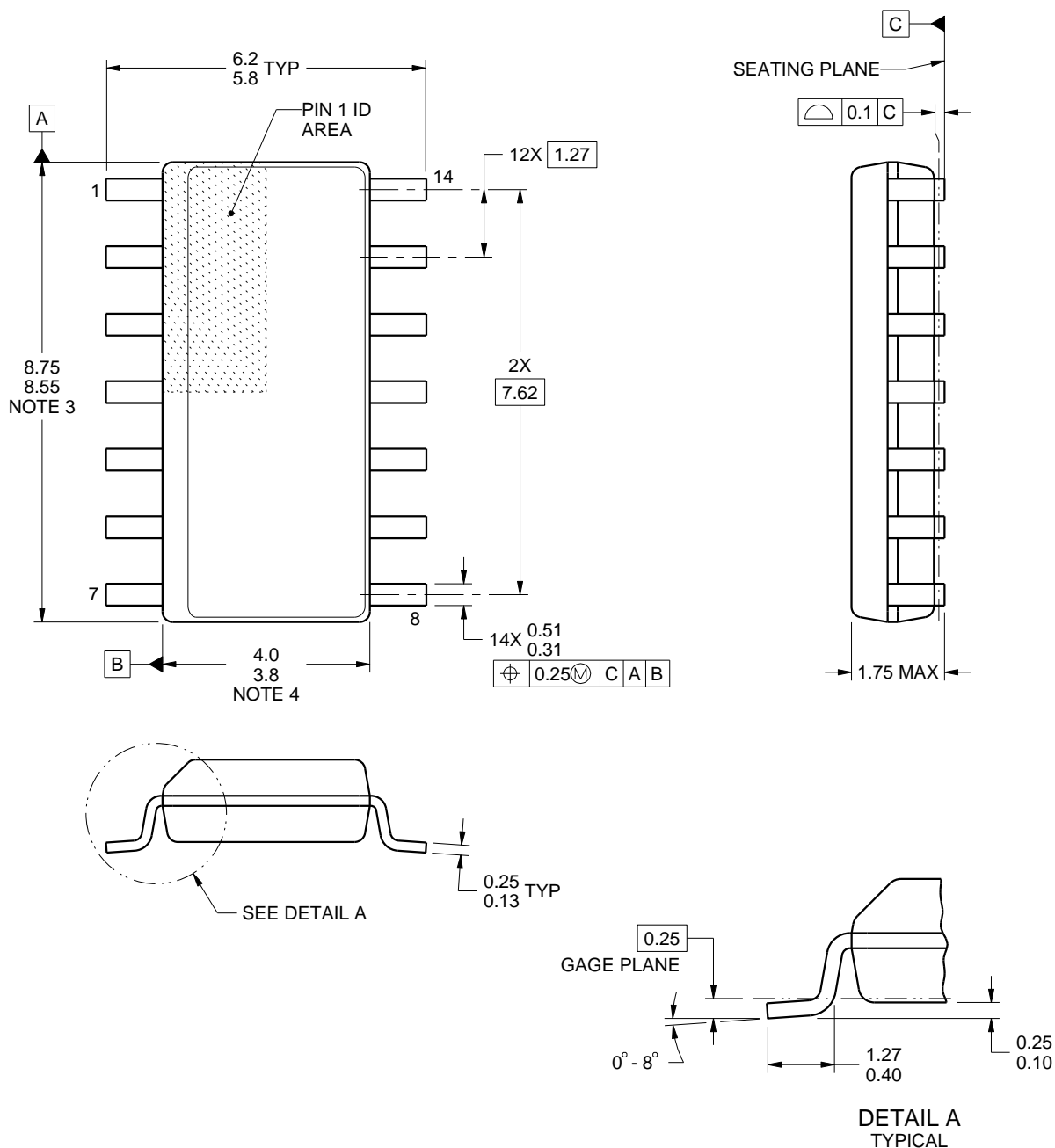


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LV05ADGVR	TVSOP	DGV	14	2000	356.0	356.0	35.0
SN74LV05ADR	SOIC	D	14	2500	353.0	353.0	32.0
SN74LV05ANSR	SOP	NS	14	2000	353.0	353.0	32.0
SN74LV05APWR	TSSOP	PW	14	2000	353.0	353.0	32.0
SN74LV05APWRG4	TSSOP	PW	14	2000	356.0	356.0	35.0

**D0014A****PACKAGE OUTLINE****SOIC - 1.75 mm max height**

SMALL OUTLINE INTEGRATED CIRCUIT



4220718/A 09/2016

**NOTES:**

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm, per side.
5. Reference JEDEC registration MS-012, variation AB.

# EXAMPLE BOARD LAYOUT

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE  
SCALE:8X



SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

## EXAMPLE STENCIL DESIGN

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:8X

4220718/A 09/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

# MECHANICAL DATA

NS (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

4040062/C 03/03

- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

## DGV (R-PDSO-G\*\*)

## PLASTIC SMALL-OUTLINE

24 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15 per side.  
 D. Falls within JEDEC: 24/48 Pins – MO-153  
 14/16/20/56 Pins – MO-194



4220202/B 12/2023

## NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.

**PW0014A**

## TSSOP - 1.2 mm max height

## SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



## SOLDER MASK DETAILS

4220202/B 12/2023

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.  
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



# EXAMPLE STENCIL DESIGN

PW0014A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE: 10X

4220202/B 12/2023

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

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