

The SN5405 is obsolete and no longer is supplied.

# SN54LS05, SN54S05 SN7405, SN74LS05, SN74S05 HEX INVERTERS WITH OPEN-COLLECTOR OUTPUTS

SDLS030A – DECEMBER 1983 – REVISED NOVEMBER 2003

- Package Options Include Plastic Small-Outline (D, NS), Shrink Small-Outline (DB), and Ceramic Flat (W) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) DIPs

- Dependable Texas Instrument Quality and Reliability

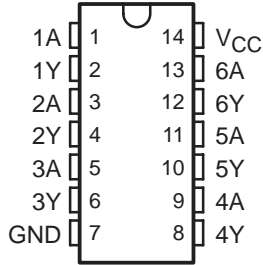
SN5405, SN54LS05, SN54S05 . . . J PACKAGE

SN7405 . . . N PACKAGE

SN74LS05 . . . D, DB, N, OR NS PACKAGE

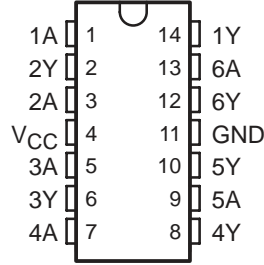
SN74S05 . . . D, N, OR NS PACKAGE

(TOP VIEW)



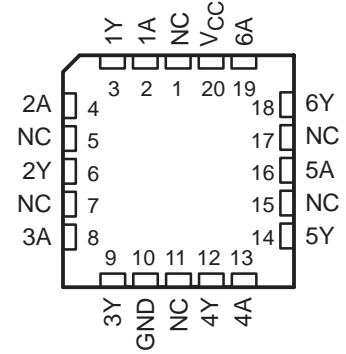
SN54LS05, SN54S05 . . . W PACKAGE

(TOP VIEW)



SN54LS05, SN54S05 . . . FK PACKAGE

(TOP VIEW)



NC – No internal connection

## description/ordering information

These devices contain six independent inverters. To perform correctly, the open-collector outputs require pullup resistors. These devices may be connected to other open-collector outputs to implement active-low wired-OR or active-high wire-AND functions. Open-collector devices often are used to generate high  $V_{OH}$  levels.

## ORDERING INFORMATION

$T_A$	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING	
0°C to 70°C	PDIP – N	Tube	SN7405N	SN7405N	
			SN74LS05N	SN74LS05N	
			SN74S05N	SN74S05N	
	SOIC – D	Tube	SN74LS05D	LS05	
			SN74LS05DR		
			Tape and reel	SN74S05D	S05
				SN74S05DR	
SOP – NS	Tape and reel	SN74LS05NSR	74LS05		
SSOP – DB	Tape and reel	SN74LS05DBR	LS05		
–55°C to 125°C	CDIP – J	Tube	SNJ54LS05J	SNJ54LS05J	
			SNJ54S05J	SNJ54S05J	
	CDIP – W	Tube	SNJ54LS05W	SNJ54LS05W	
			SNJ54S05W	SNJ54S05W	
	LCCC – FK	Tube	SNJ54LS05FK	SNJ54LS05FK	
			SNJ54S05FK	SNJ54S05FK	

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS  
INSTRUMENTS**

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On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

**SN54LS05, SN54S05**  
**SN7405, SN74LS05, SN74S05**  
**HEX INVERTERS WITH OPEN-COLLECTOR OUTPUTS**

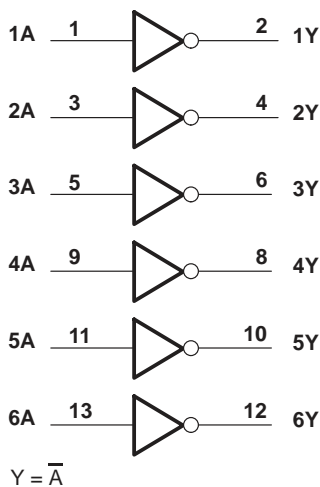
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FUNCTION TABLE  
(each inverter)

INPUT A	OUTPUT Y
H	L
L	H

**logic diagram (positive logic)**



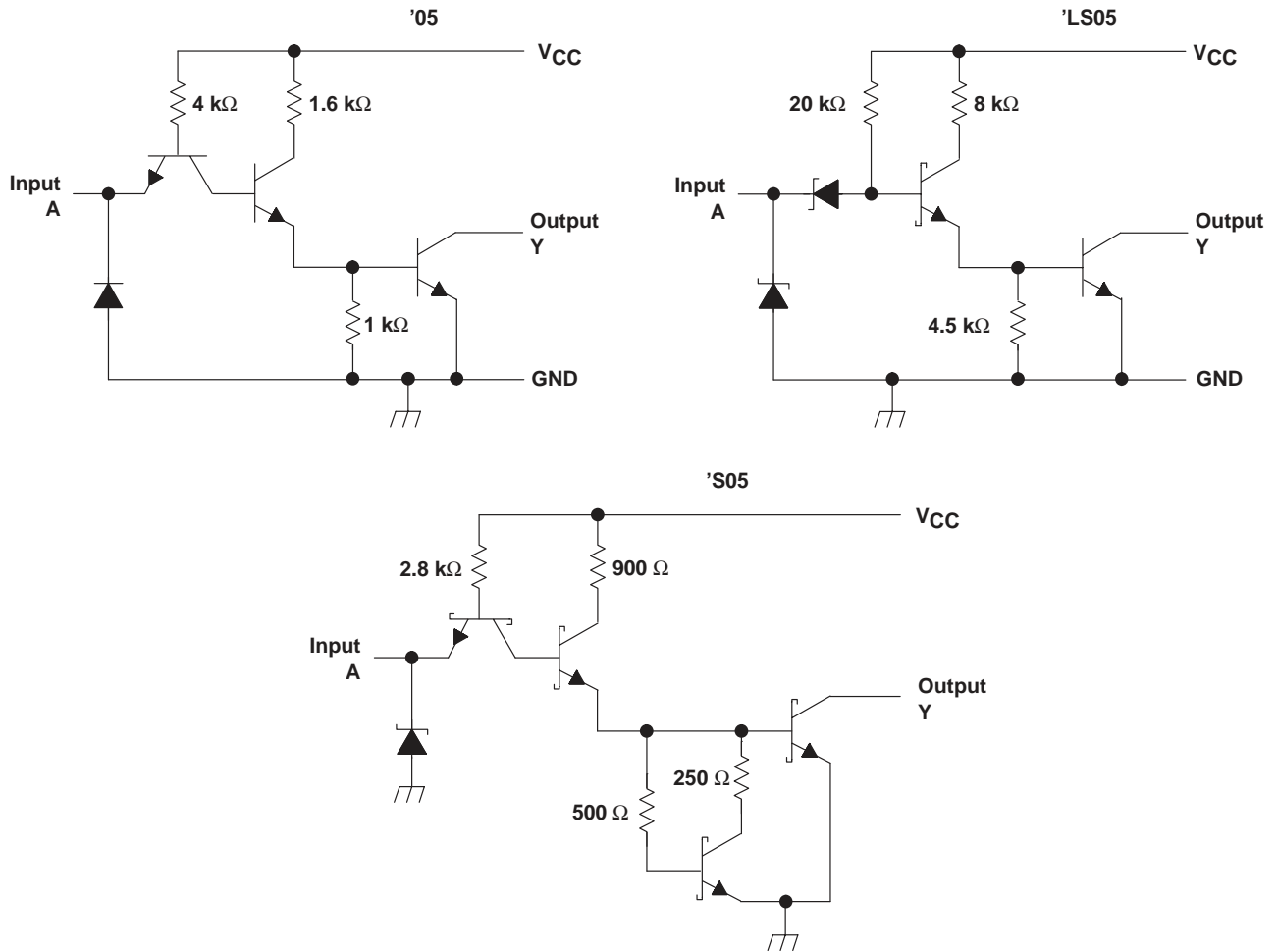
Pin numbers shown are for the D, DB, J, N, and NS packages.

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**SN54LS05, SN54S05  
SN7405, SN74LS05, SN74S05**  
**HEX INVERTERS WITH OPEN-COLLECTOR OUTPUTS**

SDLS030A – DECEMBER 1983 – REVISED NOVEMBER 2003

schematic (each inverter)



Resistor values shown are nominal.

**absolute maximum ratings over operating free-air temperature (unless otherwise noted)†**

Supply voltage, $V_{CC}$ (see Note 1): '05, 'LS05, 'S05	7 V
Input voltage, $V_I$ : '05, 'S05	5.5 V
'LS05	7 V
Off-state output voltage, $V_O$	7 V
Package thermal impedance, $\theta_{JA}$ (see Note 2): D package	86°C/W
DB package	96°C/W
N package	80°C/W
NS package	76°C/W
Storage temperature range, $T_{stg}$	-65°C to 150°C

† 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.

- NOTES: 1. Voltage values are with respect to network ground terminal.  
2. The package thermal impedance is calculated in accordance with JESD 51-7.

**SN54LS05, SN54S05  
SN7405, SN74LS05, SN74S05  
HEX INVERTERS WITH OPEN-COLLECTOR OUTPUTS**

SDLS030A – DECEMBER 1983 – REVISED NOVEMBER 2003

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**recommended operating conditions**

	SN5405			SN7405			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub> Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub> High-level input voltage	2			2			V
V <sub>IL</sub> Low-level input voltage			0.8			0.8	V
V <sub>OH</sub> High-level output voltage			5.5			5.5	V
I <sub>OL</sub> Low-level output current			16			16	mA
T <sub>A</sub> Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS†	SN5405			SN7405			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -12 mA			-1.5			-1.5	V
I <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>OH</sub> = 5.5 V V <sub>IL</sub> = 0.8 V V <sub>IL</sub> = 0.7 V						0.25	mA
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, I <sub>OL</sub> = 16 mA		0.2	0.4		0.2	0.4	V
I <sub>I</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 5.5 V			1			1	mA
I <sub>IH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.4 V			40			40	μA
I <sub>IL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V			-1.6			-1.6	mA
I <sub>CCH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0 V		6	12		6	12	mA
I <sub>CCL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 4.5 V		18	33		18	33	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

**switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see Figure 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t <sub>PLH</sub>	A	Y	R <sub>L</sub> = 4 kΩ	C <sub>L</sub> = 15 pF		40	55	ns
t <sub>PHL</sub>			R <sub>L</sub> = 400 Ω			8	15	



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**SN7405, SN74LS05, SN74S05**  
**HEX INVERTERS WITH OPEN-COLLECTOR OUTPUTS**

SDLS030A – DECEMBER 1983 – REVISED NOVEMBER 2003

**recommended operating conditions**

		SN54LS05			SN74LS05			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub>	High-level input voltage	2			2			V
V <sub>IL</sub>	Low-level input voltage				0.7			V
V <sub>OH</sub>	High-level output voltage				5.5			V
I <sub>OL</sub>	Low-level output current				4			mA
T <sub>A</sub>	Operating free-air temperature	-55			125			°C

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

PARAMETER	TEST CONDITIONS†	SN54LS05			SN74LS05			UNIT	
		MIN	TYP‡	MAX	MIN	TYP‡	MAX		
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA				-1.5			V	
I <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, V <sub>OH</sub> = 5.5 V				0.1			mA	
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V				0.25	0.4	0.25	0.4	V
					0.35			0.5	
I <sub>I</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 7 V				0.1			mA	
I <sub>IH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7 V				20			μA	
I <sub>IL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V				-0.4			mA	
I <sub>CCH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0 V				1.2	2.4	1.2	2.4	mA
I <sub>CCL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 4.5 V				3.6	6.6	3.6	6.6	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

**switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see Figure 2)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t <sub>PLH</sub>	A	Y	R <sub>L</sub> = 2 kΩ, C <sub>L</sub> = 15 pF		17	32	ns
t <sub>PHL</sub>					15	28	



**SN54LS05, SN54S05  
SN7405, SN74LS05, SN74S05  
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SDLS030A – DECEMBER 1983 – REVISED NOVEMBER 2003

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**recommended operating conditions**

	SN54S05			SN74S05			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub> Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub> High-level input voltage	2			2			V
V <sub>IL</sub> Low-level input voltage			0.8			0.8	V
V <sub>OH</sub> High-level output voltage			5.5			5.5	V
I <sub>OL</sub> Low-level output current			20			20	mA
T <sub>A</sub> Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS†		SN54S05			SN74S05			UNIT
			MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = MIN,	I <sub>I</sub> = -18 mA			-1.2			-1.2	V
I <sub>OH</sub>	V <sub>CC</sub> = MIN,	V <sub>OH</sub> = 5.5 V					0.25		mA
		V <sub>IL</sub> = 0.8 V							
		V <sub>IL</sub> = 0.7 V			0.25				
V <sub>OL</sub>	V <sub>CC</sub> = MIN,	V <sub>IH</sub> = 2 V, I <sub>OL</sub> = 20 mA			0.5			0.5	V
I <sub>I</sub>	V <sub>CC</sub> = MAX,	V <sub>I</sub> = 5.5 V			1			1	mA
I <sub>IH</sub>	V <sub>CC</sub> = MAX,	V <sub>I</sub> = 2.7 V			50			50	µA
I <sub>IL</sub>	V <sub>CC</sub> = MAX,	V <sub>I</sub> = 0.5 V			-2			-2	mA
I <sub>CCH</sub>	V <sub>CC</sub> = MAX,	V <sub>I</sub> = 0 V		9	19.8		9	19.8	mA
I <sub>CCL</sub>	V <sub>CC</sub> = MAX,	V <sub>I</sub> = 4.5 V		30	54		30	54	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

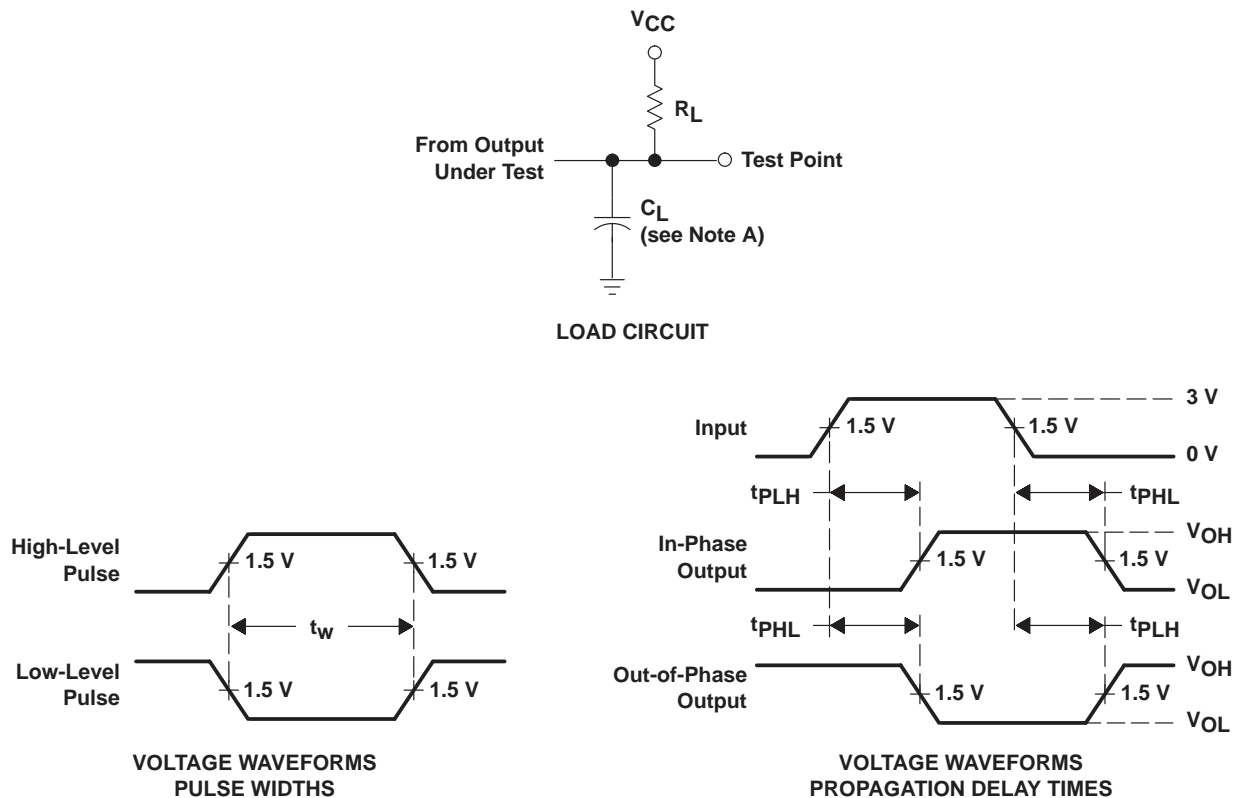
‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

**switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see Figure 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t <sub>PLH</sub>	A	Y	R <sub>L</sub> = 280 Ω	C <sub>L</sub> = 15 pF	2	5	7.5	ns
t <sub>PHL</sub>					2	4.5	7	
t <sub>PLH</sub>				C <sub>L</sub> = 50 pF	7.5	ns		
t <sub>PHL</sub>					7			



**PARAMETER MEASUREMENT INFORMATION  
SERIES 54/74 AND 54S/74S DEVICES**



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. In the examples above, the phase relationships between inputs and outputs have been chosen arbitrarily.  
 C. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1$  MHz,  $Z_O = 50 \Omega$ , and:  
 For Series 54/74,  $t_r \leq 7$  ns,  $t_f \leq 7$  ns.  
 For Series 54S/74S,  $t_r \leq 2.5$  ns,  $t_f \leq 2.5$  ns.  
 D. The outputs are measured one at a time with one input transition per measurement.

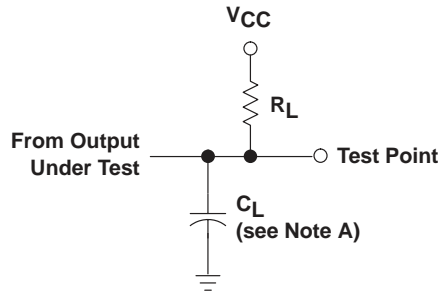
**Figure 1. Load Circuit and Voltage Waveforms**

**SN54LS05, SN54S05  
SN7405, SN74LS05, SN74S05  
HEX INVERTERS WITH OPEN-COLLECTOR OUTPUTS**

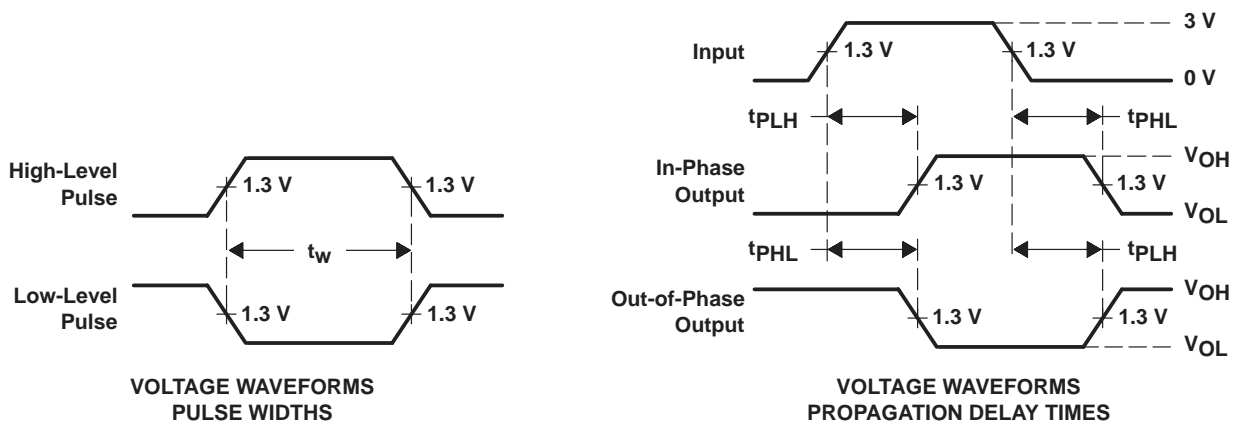
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**PARAMETER MEASUREMENT INFORMATION  
SERIES 54LS/74LS DEVICES**



**LOAD CIRCUIT**



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. In the examples above, the phase relationships between inputs and outputs have been chosen arbitrarily.  
 C. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1$  MHz,  $Z_O = 50 \Omega$ ,  $t_r \leq 1.5$  ns,  $t_f \leq 2.6$  ns.  
 D. The outputs are measured one at a time with one input transition per measurement.

**Figure 2. Load Circuit and Voltage Waveforms**



**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
JM38510/07004BCA	ACTIVE	CDIP	J	14	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 07004BCA	<a href="#">Samples</a>
M38510/07004BCA	ACTIVE	CDIP	J	14	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 07004BCA	<a href="#">Samples</a>
SN54LS05J	ACTIVE	CDIP	J	14	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54LS05J	<a href="#">Samples</a>
SN54S05J	ACTIVE	CDIP	J	14	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54S05J	<a href="#">Samples</a>
SN7405N	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN7405N	<a href="#">Samples</a>
SN7405NE4	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN7405N	<a href="#">Samples</a>
SN74LS05D	ACTIVE	SOIC	D	14	50	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS05	<a href="#">Samples</a>
SN74LS05DBR	ACTIVE	SSOP	DB	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS05	<a href="#">Samples</a>
SN74LS05DR	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS05	<a href="#">Samples</a>
SN74LS05N	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74LS05N	<a href="#">Samples</a>
SN74LS05NE4	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74LS05N	<a href="#">Samples</a>
SN74LS05NSR	ACTIVE	SO	NS	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	74LS05	<a href="#">Samples</a>
SN74S05D	ACTIVE	SOIC	D	14	50	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	S05	<a href="#">Samples</a>
SN74S05N	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74S05N	<a href="#">Samples</a>
SN74S05NSR	ACTIVE	SO	NS	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	74S05	<a href="#">Samples</a>
SNJ54LS05FK	ACTIVE	LCCC	FK	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS 05FK	<a href="#">Samples</a>
SNJ54LS05J	ACTIVE	CDIP	J	14	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS05J	<a href="#">Samples</a>
SNJ54LS05W	ACTIVE	CFP	W	14	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS05W	<a href="#">Samples</a>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SNJ54S05FK	ACTIVE	LCCC	FK	20	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54S05FK	<a href="#">Samples</a>
SNJ54S05J	ACTIVE	CDIP	J	14	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54S05J	<a href="#">Samples</a>
SNJ54S05W	ACTIVE	CFP	W	14	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54S05W	<a href="#">Samples</a>

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSELETE:** TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices 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.

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In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

**OTHER QUALIFIED VERSIONS OF SN54LS05, SN54S05, SN74LS05, SN74S05 :**

- Catalog : [SN74LS05](#), [SN74S05](#)
- Military : [SN54LS05](#), [SN54S05](#)

## NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

**TAPE AND REEL INFORMATION**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**

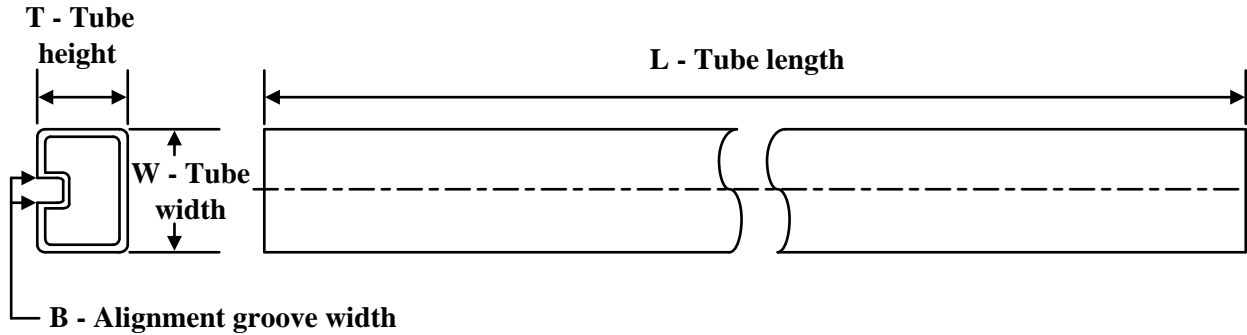

\*All dimensions are nominal

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
SN74LS05DBR	SSOP	DB	14	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1
SN74LS05DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74LS05NSR	SO	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74S05NSR	SO	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LS05DBR	SSOP	DB	14	2000	356.0	356.0	35.0
SN74LS05DR	SOIC	D	14	2500	356.0	356.0	35.0
SN74LS05NSR	SO	NS	14	2000	356.0	356.0	35.0
SN74S05NSR	SO	NS	14	2000	356.0	356.0	35.0

**TUBE**


\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
SN7405N	N	PDIP	14	25	506	13.97	11230	4.32
SN7405N	N	PDIP	14	25	506	13.97	11230	4.32
SN7405NE4	N	PDIP	14	25	506	13.97	11230	4.32
SN7405NE4	N	PDIP	14	25	506	13.97	11230	4.32
SN74LS05D	D	SOIC	14	50	506.6	8	3940	4.32
SN74LS05N	N	PDIP	14	25	506	13.97	11230	4.32
SN74LS05N	N	PDIP	14	25	506	13.97	11230	4.32
SN74LS05NE4	N	PDIP	14	25	506	13.97	11230	4.32
SN74LS05NE4	N	PDIP	14	25	506	13.97	11230	4.32
SN74S05D	D	SOIC	14	50	506.6	8	3940	4.32
SN74S05N	N	PDIP	14	25	506	13.97	11230	4.32
SN74S05N	N	PDIP	14	25	506	13.97	11230	4.32
SNJ54LS05FK	FK	LCCC	20	1	506.98	12.06	2030	NA
SNJ54LS05W	W	CFP	14	1	506.98	26.16	6220	NA
SNJ54S05FK	FK	LCCC	20	1	506.98	12.06	2030	NA

# MECHANICAL DATA

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

PLASTIC SMALL-OUTLINE PACKAGE

14-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.

W (R-GDFP-F14)

CERAMIC DUAL FLATPACK



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package can be hermetically sealed with a ceramic lid using glass frit.
  - D. Index point is provided on cap for terminal identification only.
  - E. Falls within MIL STD 1835 GDFP1-F14



## GENERIC PACKAGE VIEW

**FK 20**

**LCCC - 2.03 mm max height**

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

This image is a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.



4229370VA\

J 14

**GENERIC PACKAGE VIEW**  
**CDIP - 5.08 mm max height**  
CERAMIC DUAL IN LINE PACKAGE



Images above are just a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.

4040083-5/G

J0014A



# PACKAGE OUTLINE

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



4214771/A 05/2017

NOTES:

1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermetically sealed with a ceramic lid using glass frit.
4. Index point is provided on cap for terminal identification only and on press ceramic glass frit seal only.
5. Falls within MIL-STD-1835 and GDIP1-T14.

# EXAMPLE BOARD LAYOUT

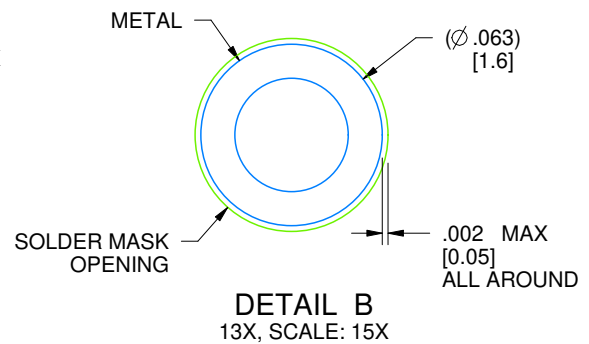
J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



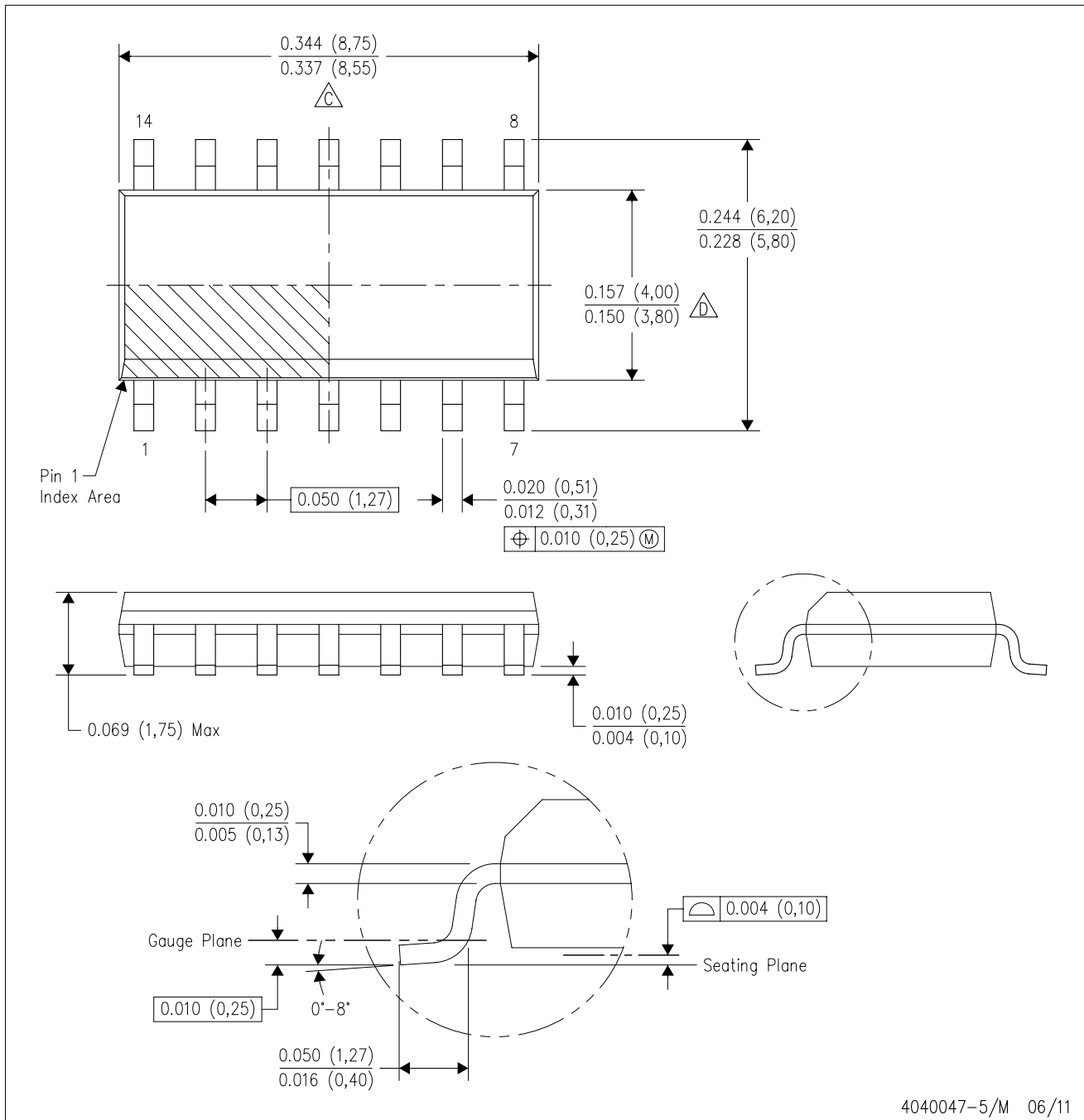
LAND PATTERN EXAMPLE  
NON-SOLDER MASK DEFINED  
SCALE: 5X



4214771/A 05/2017

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  - Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AB.

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



4211283-3/E 08/12

- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



4040049/E 12/2002

- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - $\triangle C$  Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - $\triangle D$  The 20 pin end lead shoulder width is a vendor option, either half or full width.

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

PLASTIC SMALL-OUTLINE

28 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.  
 D. Falls within JEDEC MO-150



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