

The SN5405 is obsolete and no longer is supplied.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

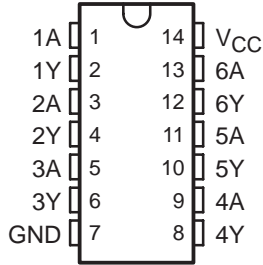
SN5405, SN54LS05, SN54S05 . . . J PACKAGE

SN7405 . . . N PACKAGE

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

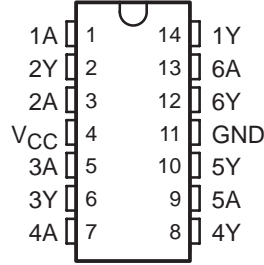
SN74S05 . . . D, N, OR NS PACKAGE

(TOP VIEW)



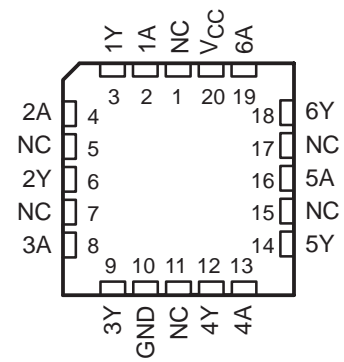
SN54LS05, SN54S05 . . . W PACKAGE

(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	
		SN74S05NSR	74S05		
	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.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 2003, Texas Instruments Incorporated
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

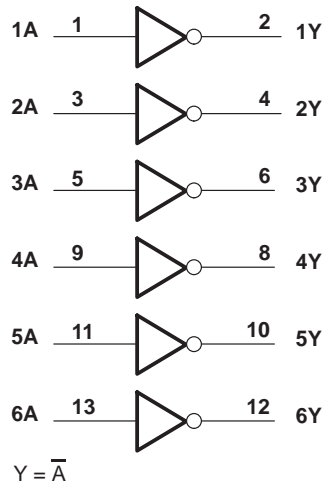
SDLS030A – DECEMBER 1983 – REVISED NOVEMBER 2003

The SN5405 is obsolete
and no longer is supplied.

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.

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

SDLS030A – DECEMBER 1983 – REVISED NOVEMBER 2003

The SN5405 is obsolete
and no longer is supplied.

recommended operating conditions

	SN5405			SN7405			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC} Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V _{IH} High-level input voltage	2			2			V
V _{IL} Low-level input voltage			0.8			0.8	V
V _{OH} High-level output voltage			5.5			5.5	V
I _{OL} Low-level output current			16			16	mA
T _A 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 _{IK}	V _{CC} = MIN, I _I = -12 mA			-1.5			-1.5	V
I _{OH}	V _{CC} = MIN, V _{OH} = 5.5 V V _{IL} = 0.8 V V _{IL} = 0.7 V						0.25	mA
V _{OL}	V _{CC} = MIN, V _{IH} = 2 V, I _{OL} = 16 mA		0.2	0.4		0.2	0.4	V
I _I	V _{CC} = MAX, V _I = 5.5 V			1			1	mA
I _{IH}	V _{CC} = MAX, V _I = 2.4 V			40			40	µA
I _{IL}	V _{CC} = MAX, V _I = 0.4 V			-1.6			-1.6	mA
I _{CCH}	V _{CC} = MAX, V _I = 0 V		6	12		6	12	mA
I _{CCL}	V _{CC} = MAX, V _I = 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_{CC} = 5 V, T_A = 25°C.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t _{PLH}	A	Y	R _L = 4 kΩ	C _L = 15 pF		40	55	ns
t _{PHL}			R _L = 400 Ω			8	15	



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

recommended operating conditions

		SN54LS05			SN74LS05			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V _{IH}	High-level input voltage	2			2			V
V _{IL}	Low-level input voltage				0.7			V
V _{OH}	High-level output voltage				5.5			V
I _{OL}	Low-level output current				4			mA
T _A	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 _{IK}	V _{CC} = MIN, I _I = -18 mA	-1.5			-1.5			V
I _{OH}	V _{CC} = MIN, V _{IL} = MAX, V _{OH} = 5.5 V	0.1			0.1			mA
V _{OL}	V _{CC} = MIN, V _{IH} = 2 V	I _{OL} = 4 mA		0.25	0.4	0.25		V
		I _{OL} = 8 mA				0.35		
I _I	V _{CC} = MAX, V _I = 7 V	0.1			0.1			mA
I _{IH}	V _{CC} = MAX, V _I = 2.7 V	20			20			μA
I _{IL}	V _{CC} = MAX, V _I = 0.4 V	-0.4			-0.4			mA
I _{CCH}	V _{CC} = MAX, V _I = 0 V	1.2		2.4	1.2		2.4	mA
I _{CCL}	V _{CC} = MAX, V _I = 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_{CC} = 5 V, T_A = 25°C.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see Figure 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t _{PLH}	A	Y	R _L = 2 kΩ, C _L = 15 pF	17		32	ns
t _{PHL}				15		28	



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

SDLS030A – DECEMBER 1983 – REVISED NOVEMBER 2003

The SN5405 is obsolete
and no longer is supplied.

recommended operating conditions

	SN54S05			SN74S05			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC} Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V _{IH} High-level input voltage	2			2			V
V _{IL} Low-level input voltage			0.8			0.8	V
V _{OH} High-level output voltage			5.5			5.5	V
I _{OL} Low-level output current			20			20	mA
T _A 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 _{IK}	V _{CC} = MIN, I _I = -18 mA			-1.2			-1.2	V	
I _{OH}	V _{CC} = MIN, V _{OH} = 5.5 V						0.25	mA	
	V _{IL} = 0.8 V								
	V _{IL} = 0.7 V			0.25					
V _{OL}	V _{CC} = MIN, V _{IH} = 2 V, I _{OL} = 20 mA			0.5			0.5	V	
I _I	V _{CC} = MAX, V _I = 5.5 V			1			1	mA	
I _{IH}	V _{CC} = MAX, V _I = 2.7 V			50			50	µA	
I _{IL}	V _{CC} = MAX, V _I = 0.5 V			-2			-2	mA	
I _{CCH}	V _{CC} = MAX, V _I = 0 V			9	19.8		9	19.8	mA
I _{CCL}	V _{CC} = MAX, V _I = 4.5 V			30	54		30	54	mA

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

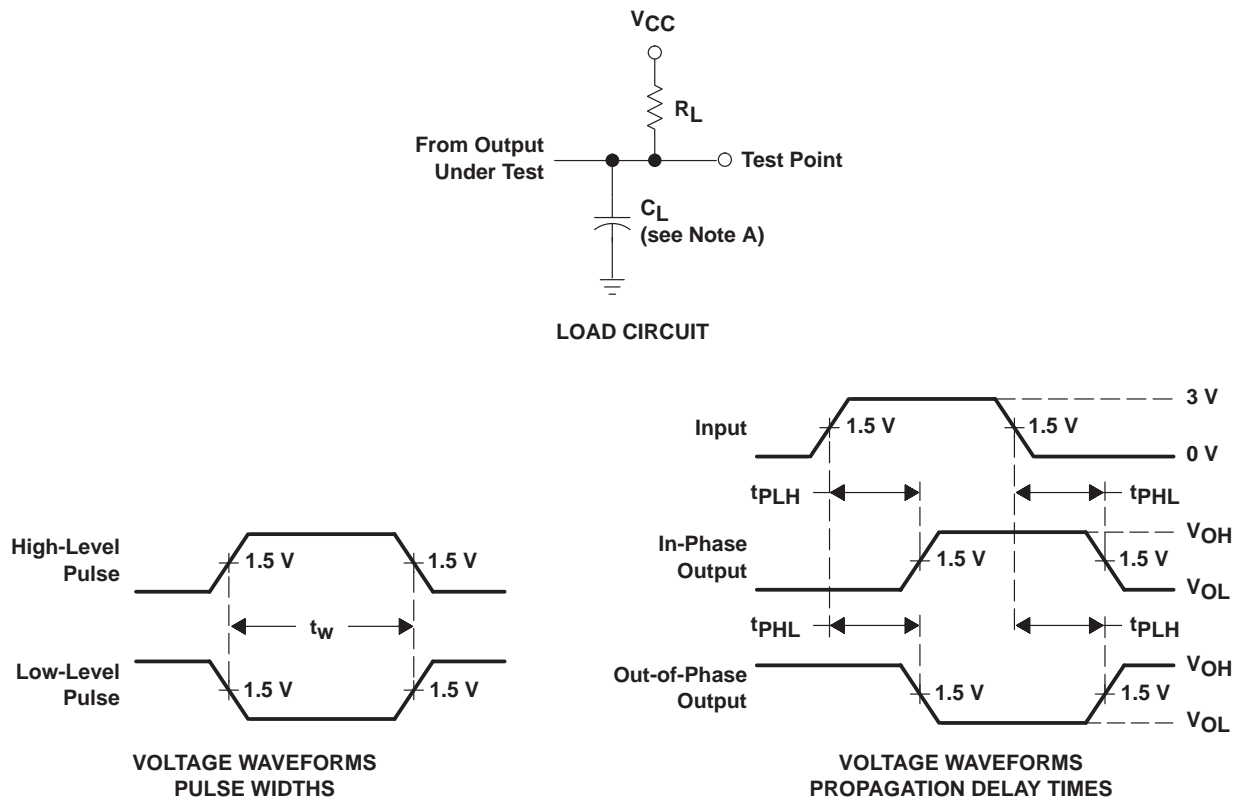
‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t _{PLH}	A	Y	R _L = 280 Ω	C _L = 15 pF	2	5	7.5	ns
t _{PHL}					2	4.5	7	
t _{PLH}				C _L = 50 pF	7.5	ns		
t _{PHL}					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: $PRR \leq 1 \text{ MHz}$, $Z_O = 50 \Omega$, and:
 For Series 54/74, $t_r \leq 7 \text{ ns}$, $t_f \leq 7 \text{ ns}$.
 For Series 54S/74S, $t_r \leq 2.5 \text{ ns}$, $t_f \leq 2.5 \text{ ns}$.
 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**

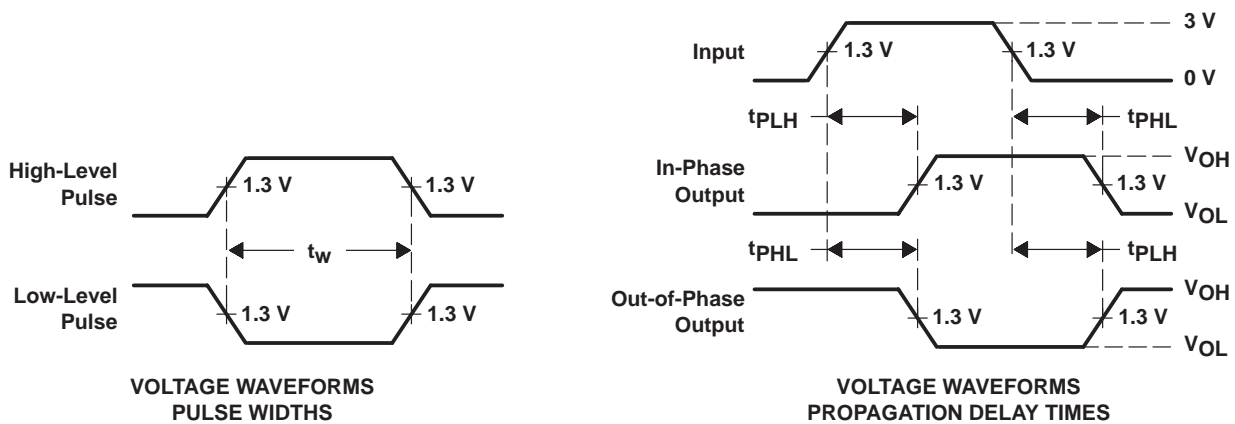
SDLS030A – DECEMBER 1983 – REVISED NOVEMBER 2003

The SN5405 is obsolete
and no longer is supplied.

**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/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
JM38510/07003BDA	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	
JM38510/07004BCA	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	
M38510/07003BDA	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	
M38510/07004BCA	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	
SN54LS05J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	
SN54S05J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	
SN7405D	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI	
SN7405DR	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI	
SN7405N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN7405N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI	
SN7405NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74LS05D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS05DBLE	OBSOLETE	SSOP	DB	14		TBD	Call TI	Call TI	
SN74LS05DBR	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS05DBRE4	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS05DBRG4	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS05DE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS05DG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS05DR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS05DRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS05DRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS05N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74LS05N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI	

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
SN74LS05NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74LS05NSR	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS05NSRG4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74S05D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74S05DE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74S05DG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74S05N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74S05N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI	
SN74S05NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74S05NSR	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74S05NSRE4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74S05NSRG4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SNJ54LS05FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
SNJ54LS05J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	
SNJ54LS05W	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	
SNJ54S05FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
SNJ54S05J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	
SNJ54S05W	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	

⁽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.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

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, SN7405, SN74LS05, SN74S05 :

- Catalog: [SN74LS05](#), [SN74S05](#)
- Military: [SN5405](#), [SN54LS05](#), [SN54S05](#)

NOTE: Qualified Version Definitions:

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

TAPE AND REEL INFORMATION
REEL DIMENSIONS

TAPE DIMENSIONS


A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

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
SN74LS05DBR	SSOP	DB	14	2000	330.0	16.4	8.2	6.6	2.5	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	367.0	367.0	38.0
SN74LS05DR	SOIC	D	14	2500	367.0	367.0	38.0
SN74LS05NSR	SO	NS	14	2000	367.0	367.0	38.0
SN74S05NSR	SO	NS	14	2000	367.0	367.0	38.0

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package is hermetically sealed with a ceramic lid using glass frit.
 - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

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 and JEDEC MO-092AB

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



NO. OF TERMINALS **	A		B	
	MIN	MAX	MIN	MAX
20	0.342 (8,69)	0.358 (9,09)	0.307 (7,80)	0.358 (9,09)
28	0.442 (11,23)	0.458 (11,63)	0.406 (10,31)	0.458 (11,63)
44	0.640 (16,26)	0.660 (16,76)	0.495 (12,58)	0.560 (14,22)
52	0.740 (18,78)	0.761 (19,32)	0.495 (12,58)	0.560 (14,22)
68	0.938 (23,83)	0.962 (24,43)	0.850 (21,6)	0.858 (21,8)
84	1.141 (28,99)	1.165 (29,59)	1.047 (26,6)	1.063 (27,0)



4040140/D 01/11

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package can be hermetically sealed with a metal lid.
 - Falls within JEDEC MS-004

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- 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.

D (R-PDSO-G14)

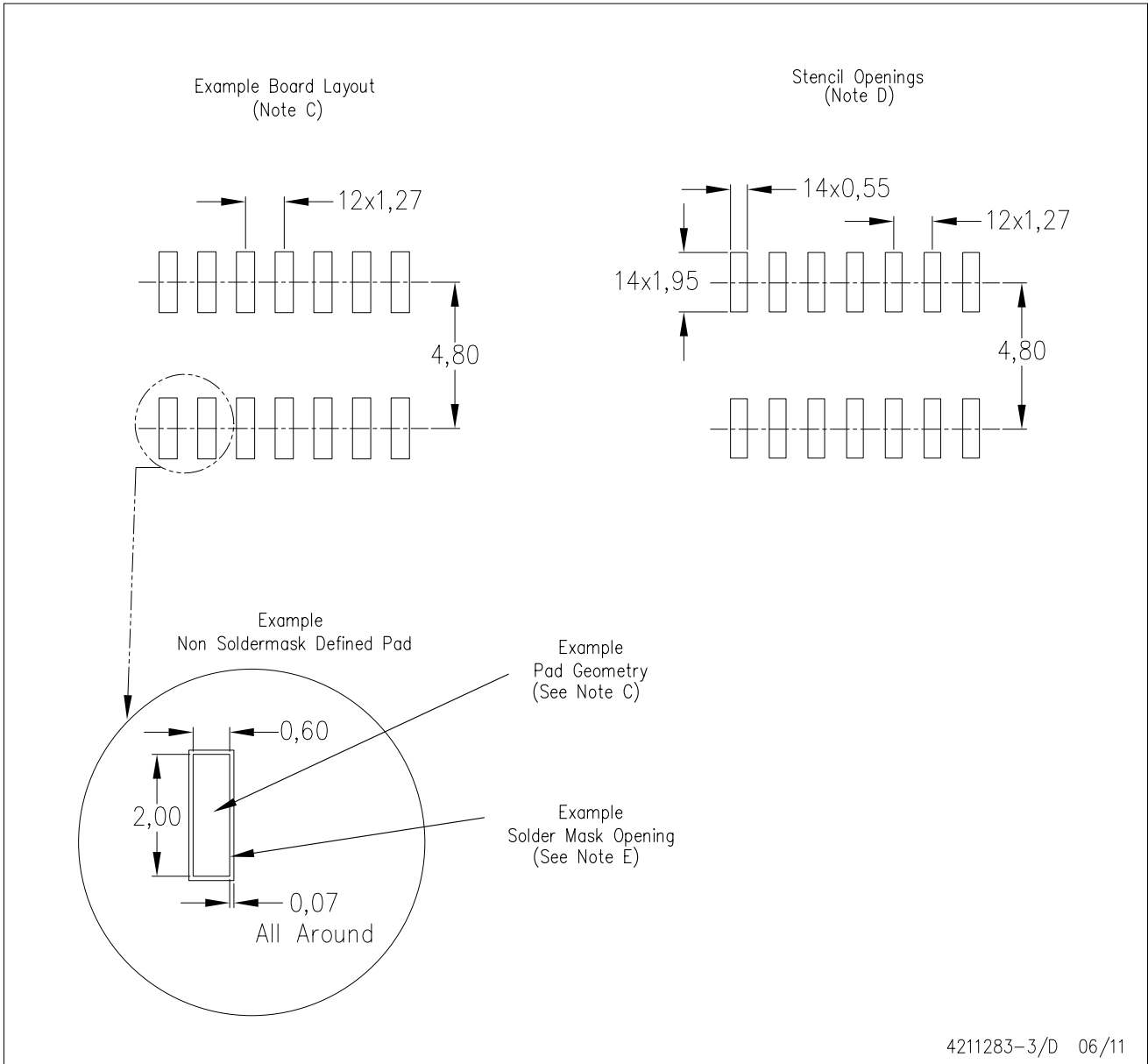
PLASTIC SMALL OUTLINE



- 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



- 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.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



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

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

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46C and to discontinue any product or service per JESD48B. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components which meet ISO/TS16949 requirements, mainly for automotive use. Components which have not been so designated are neither designed nor intended for automotive use; and TI will not be responsible for any failure of such components to meet such requirements.

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Mobile Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Video and Imaging	www.ti.com/video

TI E2E Community e2e.ti.com