

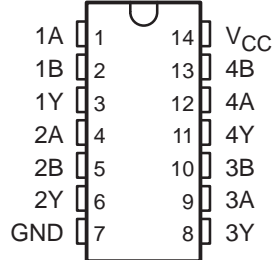
SN5400, SN54LS00, SN54S00 SN7400, SN74LS00, SN74S00 QUADRUPLE 2-INPUT POSITIVE-NAND GATES

SDLS025B – DECEMBER 1983 – REVISED OCTOBER 2003

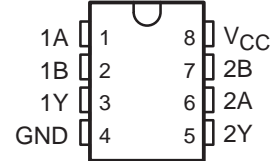
- Package Options Include Plastic Small-Outline (D, NS, PS), Shrink Small-Outline (DB), and Ceramic Flat (W) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) DIPs

- Also Available as Dual 2-Input Positive-NAND Gate in Small-Outline (PS) Package

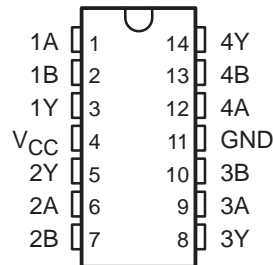
SN5400 . . . J PACKAGE
SN54LS00, SN54S00 . . . J OR W PACKAGE
SN7400, SN74S00 . . . D, N, OR NS PACKAGE
SN74LS00 . . . D, DB, N, OR NS PACKAGE
(TOP VIEW)



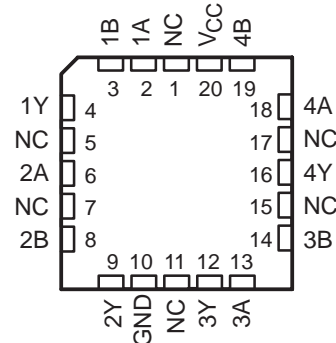
SN74LS00, SN74S00 . . . PS PACKAGE
(TOP VIEW)



SN5400 . . . W PACKAGE
(TOP VIEW)



SN54LS00, SN54S00 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

description/ordering information

These devices contain four independent 2-input NAND gates. The devices perform the Boolean function $Y = \overline{A \bullet B}$ or $Y = \overline{A} + \overline{B}$ in positive logic.



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.

SN5400, SN54LS00, SN54S00
SN7400, SN74LS00, SN74S00
QUADRUPLE 2-INPUT POSITIVE-NAND GATES

SDLS025B – DECEMBER 1983 – REVISED OCTOBER 2003

description/ordering information (continued)

ORDERING INFORMATION

| TA | PACKAGE† | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|---------------|---------------|-----------------------|------------------|
| 0°C to 70°C | PDIP – N | Tube | SN7400N | SN7400N |
| | | | SN74LS00N | SN74LS00N |
| | | | SN74S00N | SN74S00N |
| | SOIC – D | Tube | SN7400D | 7400 |
| | | | SN7400DR | |
| | | Tape and reel | SN74LS00D | LS00 |
| | | | SN74LS00DR | |
| | | Tube | SN74S00D | S00 |
| | | | SN74S00DR | |
| | SOP – NS | Tape and reel | SN7400NSR | SN7400 |
| | | | SN74LS00NSR | 74LS00 |
| | | | SN74S00NSR | 74S00 |
| | SOP – PS | Tape and reel | SN74LS00PSR | LS00 |
| | | | SN74S00PSR | S00 |
| SSOP – DB | Tape and reel | SN74LS00DBR | LS00 | |
| –55°C to 125°C | CDIP – J | Tube | SNJ5400J | SNJ5400J |
| | | | SNJ54LS00J | SNJ54LS00J |
| | | | SNJ54S00J | SNJ54S00J |
| | CFP – W | Tube | SNJ5400W | SNJ5400W |
| | | | SNJ54LS00W | SNJ54LS00W |
| | | | SNJ54S00W | SNJ54S00W |
| | LCCC – FK | Tube | SNJ54LS00FK | SNJ54LS00FK |
| | | | SNJ54S00FK | SNJ54S00FK |

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

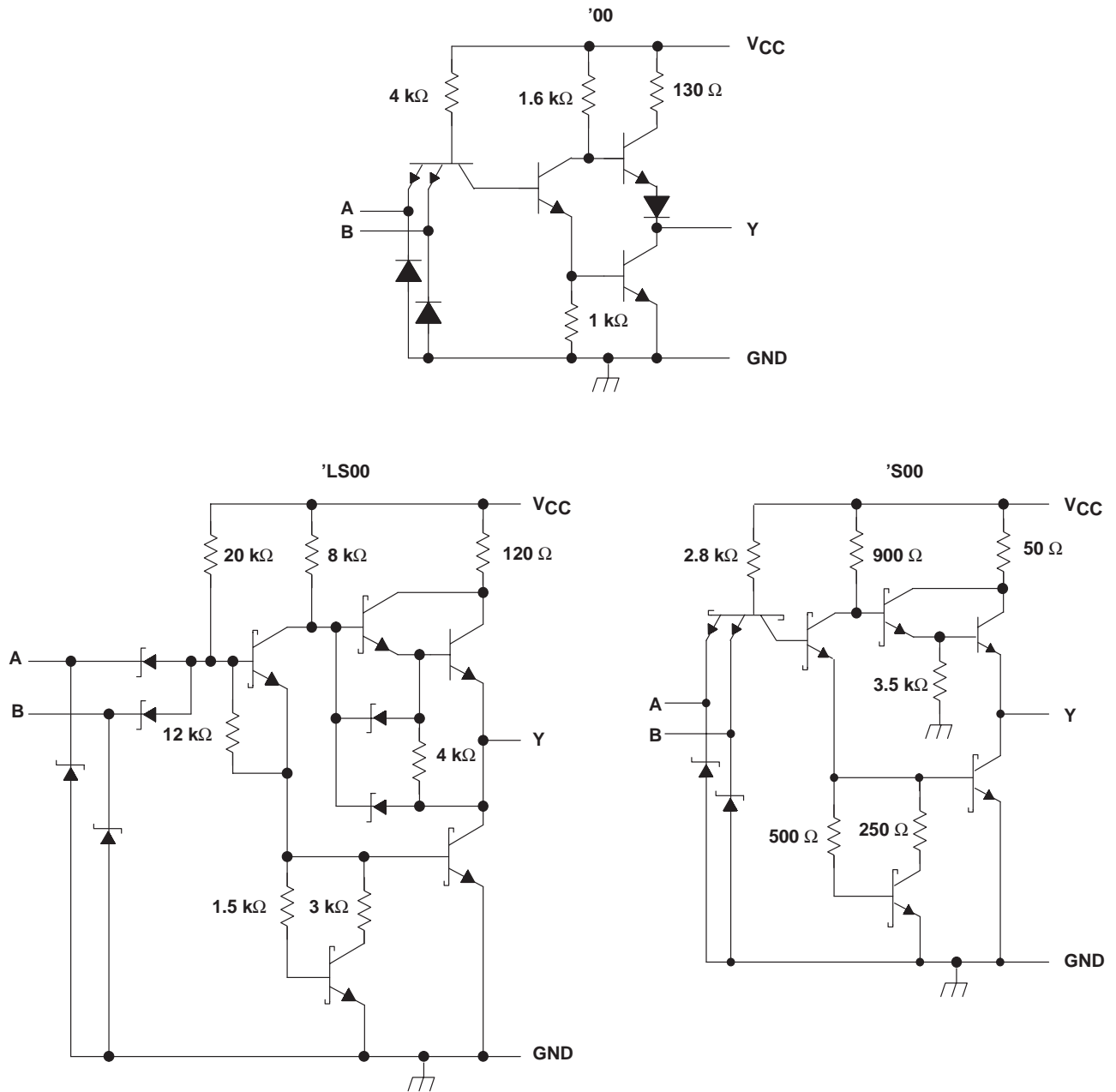
FUNCTION TABLE
(each gate)

| INPUTS | | OUTPUT |
|--------|---|--------|
| A | B | Y |
| H | H | L |
| L | X | H |
| X | L | H |

logic diagram, each gate (positive logic)



schematic



Resistor values shown are nominal.

**SN5400, SN54LS00, SN54S00
SN7400, SN74LS00, SN74S00
QUADRUPLE 2-INPUT POSITIVE-NAND GATES**

SDLS025B – DECEMBER 1983 – REVISED OCTOBER 2003

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

| | |
|--|----------------|
| Supply voltage, V_{CC} (see Note 1) | 7 V |
| Input voltage: '00, 'S00 | 5.5 V |
| 'LS00 | 7 V |
| Package thermal impedance, θ_{JA} (see Note 2): D package | 86°C/W |
| DB package | 96°C/W |
| N package | 80°C/W |
| NS package | 76°C/W |
| PS package | 95°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.

recommended operating conditions (see Note 3)

| | SN5400 | | | SN7400 | | | 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 |
| I_{OH} High-level output current | | | -0.4 | | | -0.4 | mA |
| I_{OL} Low-level output current | | | 16 | | | 16 | mA |
| T_A Operating free-air temperature | -55 | | 125 | 0 | | 70 | °C |

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

| PARAMETER | TEST CONDITIONS‡ | SN5400 | | | SN7400 | | | UNIT |
|---------------------------|---|--------|------|------|--------|------|------|------|
| | | MIN | TYP§ | MAX | MIN | TYP§ | MAX | |
| V_{IK} | $V_{CC} = \text{MIN}, I_I = -12 \text{ mA}$ | | | -1.5 | | | -1.5 | V |
| V_{OH} | $V_{CC} = \text{MIN}, V_{IL} = 0.8 \text{ V}, I_{OH} = -0.4 \text{ mA}$ | 2.4 | 3.4 | | 2.4 | 3.4 | | V |
| V_{OL} | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, I_{OL} = 16 \text{ mA}$ | | 0.2 | 0.4 | | 0.2 | 0.4 | V |
| I_I | $V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$ | | | 1 | | | 1 | mA |
| I_{IH} | $V_{CC} = \text{MAX}, V_I = 2.4 \text{ V}$ | | | 40 | | | 40 | µA |
| I_{IL} | $V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$ | | | -1.6 | | | -1.6 | mA |
| $I_{OS}^{\dagger\dagger}$ | $V_{CC} = \text{MAX}$ | -20 | | -55 | -18 | | -55 | mA |
| I_{CCH} | $V_{CC} = \text{MAX}, V_I = 0 \text{ V}$ | | 4 | 8 | | 4 | 8 | mA |
| I_{CCL} | $V_{CC} = \text{MAX}, V_I = 4.5 \text{ V}$ | | 12 | 22 | | 12 | 22 | mA |

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

§ All typical values are at $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$.

†† Not more than one output should be shorted at a time.



SN5400, SN54LS00, SN54S00
SN7400, SN74LS00, SN74S00
QUADRUPLE 2-INPUT POSITIVE-NAND GATES
SDLS025B – DECEMBER 1983 – REVISED OCTOBER 2003

switching characteristics, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$ (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | SN5400 SN7400 | | | UNIT |
|-----------|--------------|-------------|--|------------------|-----|-----|------|
| | | | | MIN | TYP | MAX | |
| t_{PLH} | A or B | Y | $R_L = 400\ \Omega$, $C_L = 15\text{ pF}$ | | 11 | 22 | ns |
| t_{PHL} | | | | | 7 | 15 | |

recommended operating conditions (see Note 4)

| | SN54LS00 | | | SN74LS00 | | | 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 | | | 0.8 | V |
| I_{OH} High-level output current | | | -0.4 | | | -0.4 | mA |
| I_{OL} Low-level output current | | | 4 | | | 8 | mA |
| T_A Operating free-air temperature | -55 | | 125 | 0 | | 70 | $^\circ\text{C}$ |

NOTE 4: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

| PARAMETER | TEST CONDITIONS [†] | SN54LS00 | | | SN74LS00 | | | UNIT |
|---------------|---|------------------------|------------------|------|----------|------------------|------|---------------|
| | | MIN | TYP [‡] | MAX | MIN | TYP [‡] | MAX | |
| V_{IK} | $V_{CC} = \text{MIN}$, $I_I = -18\text{ mA}$ | | | -1.5 | | | -1.5 | V |
| V_{OH} | $V_{CC} = \text{MIN}$, $V_{IL} = \text{MAX}$, $I_{OH} = -0.4\text{ mA}$ | 2.5 | 3.4 | | 2.7 | 3.4 | | V |
| V_{OL} | $V_{CC} = \text{MIN}$, $V_{IH} = 2\text{ V}$ | $I_{OL} = 4\text{ mA}$ | | 0.25 | 0.4 | 0.25 | 0.4 | V |
| | | $I_{OL} = 8\text{ mA}$ | | | | 0.35 | 0.5 | |
| I_I | $V_{CC} = \text{MAX}$, $V_I = 7\text{ V}$ | | | 0.1 | | | 0.1 | mA |
| I_{IH} | $V_{CC} = \text{MAX}$, $V_I = 2.7\text{ V}$ | | | 20 | | | 20 | μA |
| I_{IL} | $V_{CC} = \text{MAX}$, $V_I = 0.4\text{ V}$ | | | -0.4 | | | -0.4 | mA |
| I_{OS}^{\S} | $V_{CC} = \text{MAX}$ | -20 | | -100 | -20 | | -100 | mA |
| I_{CCH} | $V_{CC} = \text{MAX}$, $V_I = 0\text{ V}$ | | 0.8 | 1.6 | | 0.8 | 1.6 | mA |
| I_{CCL} | $V_{CC} = \text{MAX}$, $V_I = 4.5\text{ V}$ | | 2.4 | 4.4 | | 2.4 | 4.4 | mA |

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

[‡] All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$.

[§] Not more than one output should be shorted at a time.

switching characteristics, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$ (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | SN54LS00 SN74LS00 | | | UNIT |
|-----------|--------------|-------------|---|----------------------|-----|-----|------|
| | | | | MIN | TYP | MAX | |
| t_{PLH} | A or B | Y | $R_L = 2\text{ k}\Omega$, $C_L = 15\text{ pF}$ | | 9 | 15 | ns |
| t_{PHL} | | | | | 10 | 15 | |



SN5400, SN54LS00, SN54S00
SN7400, SN74LS00, SN74S00
QUADRUPLE 2-INPUT POSITIVE-NAND GATES

SDLS025B – DECEMBER 1983 – REVISED OCTOBER 2003

recommended operating conditions (see Note 5)

| | | SN54S00 | | | SN74S00 | | | 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 | | | V |
| I _{OH} | High-level output current | | | | -1 | | | mA |
| I _{OL} | Low-level output current | | | | 20 | | | mA |
| T _A | Operating free-air temperature | -55 | | | 125 | | | °C |

NOTE 5: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

| PARAMETER | TEST CONDITIONS† | SN54S00 | | | SN74S00 | | | UNIT | |
|-------------------|---|---------|------|------|---------|------|------|------|----|
| | | MIN | TYP‡ | MAX | MIN | TYP‡ | MAX | | |
| V _{IK} | V _{CC} = MIN, I _I = -18 mA | -1.2 | | | -1.2 | | | V | |
| V _{OH} | V _{CC} = MIN, V _{IL} = 0.8 V, I _{OH} = -1 mA | 2.5 | 3.4 | | 2.7 | 3.4 | | V | |
| 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 = 0.5V | -2 | | | -2 | | | mA | |
| I _{OS} § | V _{CC} = MAX | -40 | | -100 | -40 | | -100 | mA | |
| I _{CCH} | V _{CC} = MAX, V _I = 0 V | 10 | | | 10 | | | 16 | mA |
| I _{CCL} | V _{CC} = MAX, V _I = 4.5 V | 20 | | | 20 | | | 36 | 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.

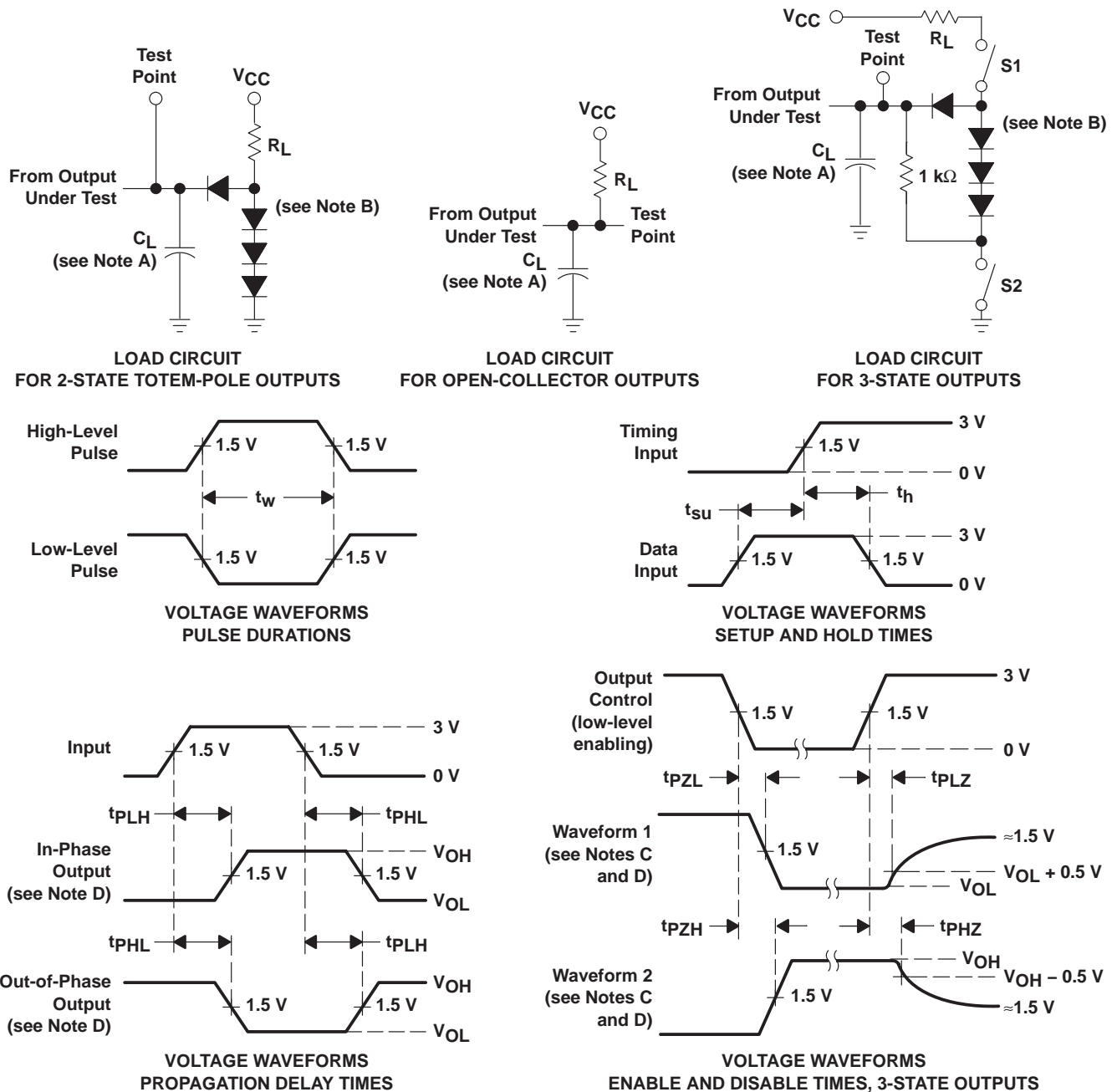
§ Not more than one output should be shorted at a time.

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

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | SN54S00 SN74S00 | | | UNIT |
|------------------|--------------|-------------|--|--------------------|-----|-----|------|
| | | | | MIN | TYP | MAX | |
| t _{PLH} | A or B | Y | R _L = 280 Ω, C _L = 15 pF | 3 | | 4.5 | ns |
| t _{PHL} | | | | 3 | | 5 | |
| t _{PLH} | A or B | Y | R _L = 280 Ω, C _L = 50 pF | 4.5 | | 5 | ns |
| t _{PHL} | | | | 5 | | | |



PARAMETER MEASUREMENT INFORMATION
SERIES 54/74 DEVICES



- NOTES: A. C_L includes probe and jig capacitance.
 B. All diodes are 1N3064 or equivalent.
 C. 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.
 D. S1 and S2 are closed for t_{PLH} , t_{PHL} , t_{PHZ} , and t_{PLZ} ; S1 is open and S2 is closed for t_{PZH} ; S1 is closed and S2 is open for t_{PZL} .
 E. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1$ MHz, $Z_O \approx 50 \Omega$; t_r and $t_f \leq 7$ ns for Series 54/74 devices and t_r and $t_f \leq 2.5$ ns for Series 54S/74S devices.
 F. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuits 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⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|--|
| JM38510/00104BCA | ACTIVE | CDIP | J | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |
| JM38510/00104BDA | ACTIVE | CFP | W | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |
| JM38510/07001BCA | ACTIVE | CDIP | J | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |
| JM38510/07001BDA | ACTIVE | CFP | W | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |
| JM38510/30001B2A | ACTIVE | LCCC | FK | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| JM38510/30001BCA | ACTIVE | CDIP | J | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |
| JM38510/30001BDA | ACTIVE | CFP | W | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |
| JM38510/30001SCA | ACTIVE | CDIP | J | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |
| JM38510/30001SDA | ACTIVE | CFP | W | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SN5400J | ACTIVE | CDIP | J | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SN54LS00J | ACTIVE | CDIP | J | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SN54S00J | ACTIVE | CDIP | J | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SN7400D | ACTIVE | SOIC | D | 14 | 50 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN7400DR | ACTIVE | SOIC | D | 14 | 2500 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN7400N | ACTIVE | PDIP | N | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SN7400N3 | OBSOLETE | PDIP | N | 14 | | TBD | Call TI | Call TI |
| SN7400NSR | ACTIVE | SO | NS | 14 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74LS00D | ACTIVE | SOIC | D | 14 | 50 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74LS00DBLE | OBSOLETE | SSOP | DB | 14 | | TBD | Call TI | Call TI |
| SN74LS00DBR | ACTIVE | SSOP | DB | 14 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74LS00DR | ACTIVE | SOIC | D | 14 | 2500 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74LS00J | OBSOLETE | CDIP | J | 14 | | TBD | Call TI | Call TI |
| SN74LS00N | ACTIVE | PDIP | N | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SN74LS00NSR | ACTIVE | SO | NS | 14 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74LS00PSR | ACTIVE | SO | PS | 8 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74S00D | ACTIVE | SOIC | D | 14 | 50 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74S00DR | ACTIVE | SOIC | D | 14 | 2500 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74S00N | ACTIVE | PDIP | N | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SN74S00N3 | OBSOLETE | PDIP | N | 14 | | TBD | Call TI | Call TI |
| SN74S00NSR | ACTIVE | SO | NS | 14 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74S00PSR | ACTIVE | SO | PS | 8 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SNJ5400J | ACTIVE | CDIP | J | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| SNJ5400W | ACTIVE | CFP | W | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SNJ5400WA | OBSOLETE | CFP | WA | 14 | | TBD | Call TI | Level-NC-NC-NC |
| SNJ54LS00FK | ACTIVE | LCCC | FK | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SNJ54LS00J | ACTIVE | CDIP | J | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SNJ54LS00W | ACTIVE | CFP | W | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SNJ54S00FK | ACTIVE | LCCC | FK | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SNJ54S00J | ACTIVE | CDIP | J | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SNJ54S00W | ACTIVE | CFP | W | 14 | 1 | TBD | Call TI | Level-NC-NC-NC |

⁽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) 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.

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)

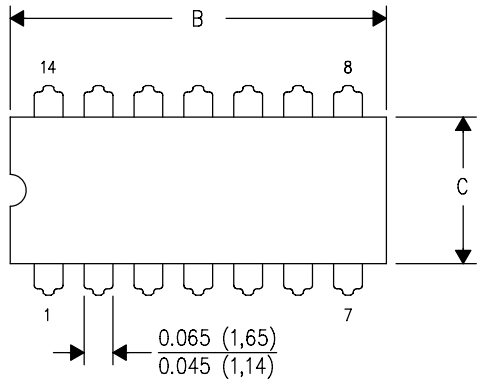
⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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.

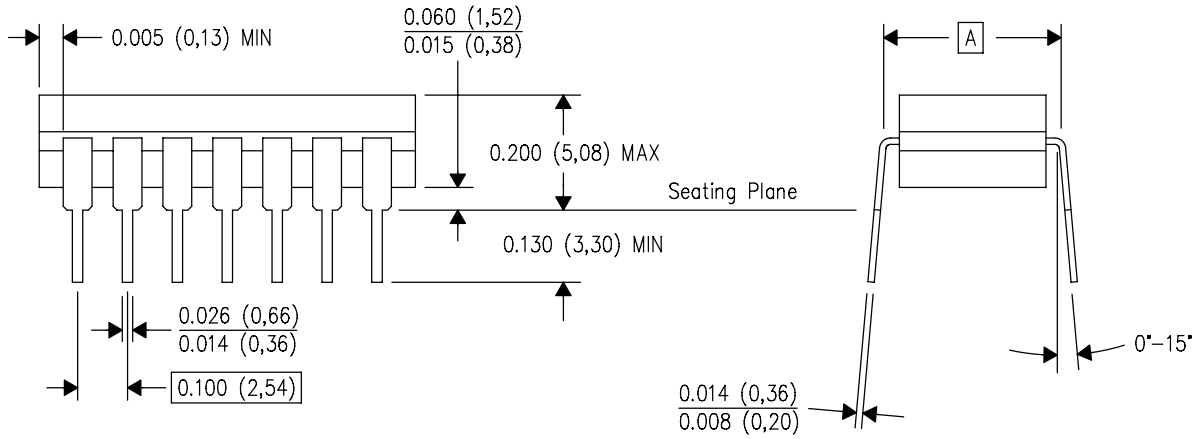
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

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:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package can be hermetically sealed with a ceramic lid using glass frit.
 - Index point is provided on cap for terminal identification only.
 - Falls within MIL STD 1835 GDFP1-F14 and JEDEC MO-092AB

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



4040140/D 10/96

- 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 metal lid.
 - D. The terminals are gold plated.
 - E. 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.
 - C Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - D The 20 pin end lead shoulder width is a vendor option, either half or full width.

4040049/E 12/2002

D (R-PDSO-G14)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - D. Falls within JEDEC MS-012 variation AB.

MECHANICAL DATA

PS (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



- 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.

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.

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, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

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

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

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI 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 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. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

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

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

| Products | | Applications | |
|------------------|--|---------------------|--|
| Amplifiers | amplifier.ti.com | Audio | www.ti.com/audio |
| Data Converters | dataconverter.ti.com | Automotive | www.ti.com/automotive |
| DSP | dsp.ti.com | Broadband | www.ti.com/broadband |
| Interface | interface.ti.com | Digital Control | www.ti.com/digitalcontrol |
| Logic | logic.ti.com | Military | www.ti.com/military |
| Power Mgmt | power.ti.com | Optical Networking | www.ti.com/opticalnetwork |
| Microcontrollers | microcontroller.ti.com | Security | www.ti.com/security |
| | | Telephony | www.ti.com/telephony |
| | | Video & Imaging | www.ti.com/video |
| | | Wireless | www.ti.com/wireless |

Mailing Address: Texas Instruments
Post Office Box 655303 Dallas, Texas 75265