TEXAS INSTRUMENTS

SN5400, SN54LS00, SN54S00
SN7400, SN74LS00, SN74S00

SDLS025D – DECEMBER 1983 – REVISED MAY 2017

# SNx400, SNx4LS00, and SNx4S00 Quadruple 2-Input Positive-NAND Gates

## 1 Features

- Package Options Include:
  - Plastic Small-Outline (D, NS, PS)
  - Shrink Small-Outline (DB)
  - Ceramic Flat (W)
  - Ceramic Chip Carriers (FK)
  - Standard Plastic (N)
  - Ceramic (J)
- Also Available as Dual 2-Input Positive-NAND Gate in Small-Outline (PS) Package
- Inputs Are TTL Compliant; $V_{IH}$ = 2 V and $V_{IL}$ = 0.8 V
- Inputs Can Accept 3.3-V or 2.5-V Logic Inputs
- SN5400, SN54LS00, and SN54S00 are Characterized For Operation Over the Full Military Temperature Range of –55ºC to 125ºC

## 2 Applications

- AV Receivers
- Portable Audio Docks
- Blu-Ray Players
- Home Theater
- MP3 Players or Recorders
- Personal Digital Assistants (PDAs)

## 3 Description

The SNx4xx00 devices contain four independent, 2-input NAND gates. The devices perform the Boolean function $Y = \overline{A \cdot B}$ or $Y = \overline{A} + \overline{B}$ in positive logic.

**Device Information**(1)

| PART NUMBER | PACKAGE | BODY SIZE (NOM) |
|---|---|---|
| SN74LS00DB | SSOP (14) | 6.20 mm × 5.30 mm |
| SN7400D, SN74LS00D, SN74S00D | SOIC (14) | 8.65 mm × 3.91 mm |
| SN74LS00NSR | PDIP (14) | 19.30 × 6.35 mm |
| SNJ5400J, SNJ54LS00J, SNJ54S00J | CDIP (14) | 19.56 mm × 6.67 mm |
| SNJ5400W, SNJ54LS00W, SNJ54S00W | CFP (14) | 9.21 mm × 5.97 mm |
| SN54LS00FK, SN54S00FK | LCCC (20) | 8.89 mm × 8.89 mm |
| SN7400NS, SN74LS00NS, SN74S00NS | SO (14) | 10.30 mm × 5.30 mm |
| SN7400PS, SN74LS00PS | SO (8) | 6.20 mm × 5.30 mm |

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

**Logic Diagram, Each Gate (Positive Logic)**

An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. PRODUCTION DATA.

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## 4 Revision History

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

**Changes from Revision C (November 2016) to Revision D** **Page**

- Changed *Typical Application* Diagram see *Application and Implementation* section ... 1

**Changes from Revision B (October 2003) to Revision C** **Page**

- Added *ESD Ratings* table, *Feature Description* section, *Device Functional Modes*, *Application and Implementation Power Supply Recommendations* section, *Layout* section, *Device and Documentation Support* section, and *Mechanical, Packaging, and Orderable Information* section. ... 1
- Changed *Ordering Information* table to *Device Comparison Table*; see *Package Option Addendum* at the end of the data sheet ... 1
- Changed Package thermal impedance, $R_{\theta JA}$, values in *Thermal Information* table From: 86°C/W To: 90.9°C/W (D), From: 96°C/W To: 102.8°C/W (DB), From: 80°C/W To: 54.8°C/W (N), and From: 76°C/W To: 89.7°C/W (NS) ... 6


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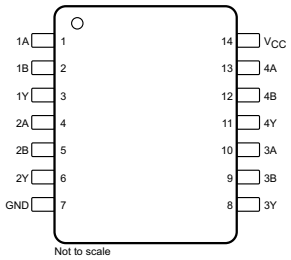
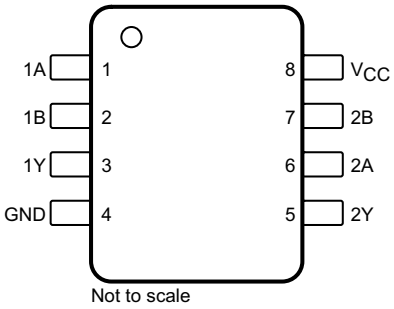
# 5 Pin Configuration and Functions

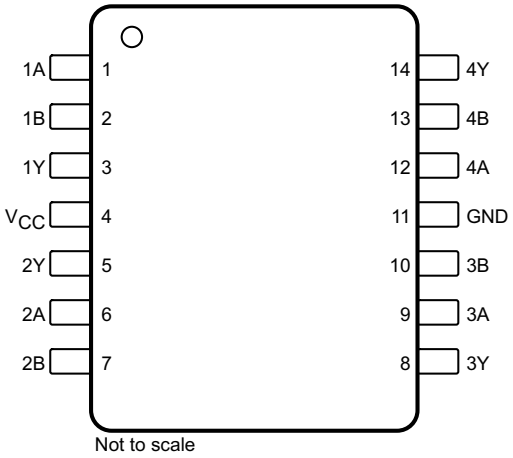
**SN5400 J, SN54xx00 J and W, SN74x00 D, N, and NS, or SN74LS00 D, DB, N, and NS Packages**
**14-Pin CDIP, CFP, SOIC, PDIP, SO, or SSOP**
**Top View**



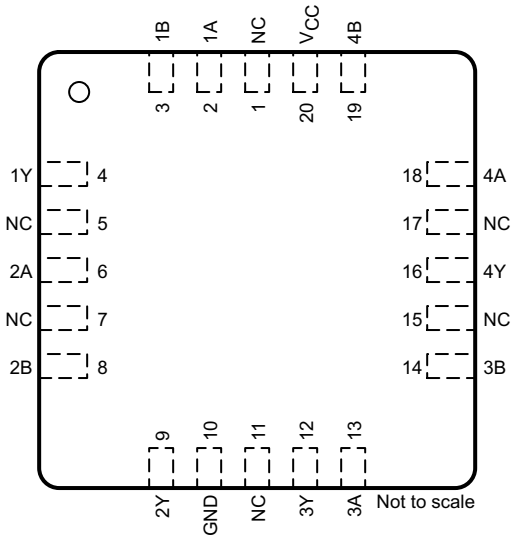

**SN5400 W Package**
**14-Pin CFP**
**Top View**




**SN74xx00 PS Package**
**18-Pin SO**
**Top View**




**SN54xx00 FK Package**
**20-Pin LCCC**
**Top View**




**Pin Functions**

| PIN | | | | | I/O | DESCRIPTION |
|---|---|---|---|---|---|---|
| NAME | CDIP, CFP, SOIC, PDIP, SO, SSOP | SO (SN74xx00) | CFP (SN5400) | LCCC | | |
| 1A | 1 | 1 | 1 | 2 | I | Gate 1 input |
| 1B | 2 | 2 | 2 | 3 | I | Gate 1 input |
| 1Y | 3 | 3 | 3 | 4 | O | Gate 1 output |
| 2A | 4 | 6 | 6 | 6 | I | Gate 2 input |
| 2B | 5 | 7 | 7 | 8 | I | Gate 2 input |
| 2Y | 6 | 5 | 5 | 9 | O | Gate 2 output |
| 3A | 10 | — | 9 | 13 | I | Gate 3 input |
| 3B | 9 | — | 10 | 14 | I | Gate 3 input |

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**Pin Functions (continued)**

| PIN | | | | | I/O | DESCRIPTION |
|---|---|---|---|---|---|---|
| NAME | CDIP, CFP, SOIC, PDIP, SO, SSOP | SO (SN74xx00) | CFP (SN5400) | LCCC | | |
| 3Y | 8 | — | 8 | 12 | O | Gate 3 output |
| 4A | 13 | — | 12 | 18 | I | Gate 4 input |
| 4B | 12 | — | 13 | 19 | I | Gate 4 input |
| 4Y | 11 | — | 14 | 16 | O | Gate 4 output |
| GND | 7 | 4 | 11 | 10 | — | Ground |
| NC | — | — | — | 1, 5, 7, 11, 15, 17 | — | No connect |
| $V_{CC}$ | 14 | 8 | 4 | 20 | — | Power supply |

# 6 Specifications

## 6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)(1)

| | | MIN | MAX | UNIT |
|---|---|---|---|---|
| Supply voltage, $V_{CC}$(2) | | | 7 | V |
| Input voltage | SNx400 and SNxS400 | | 5.5 | V |
| | SNx4LS00 | | 7 | |
| Junction temperature, $T_J$ | | | 150 | °C |
| Storage temperature, $T_{stg}$ | | –65 | 150 | °C |

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) Voltage values are with respect to network ground terminal.

## 6.2 ESD Ratings: SN74LS00

| | | | VALUE | UNIT |
|---|---|---|---|---|
| $V_{(ESD)}$ | Electrostatic discharge | Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001(1) | ±500 | V |
| | | Charged-device model (CDM), per JEDEC specification JESD22-C101(2) | ±2000 | |

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process. Manufacturing with less than 500-V HBM is possible with the necessary precautions.
(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process. Manufacturing with less than 250-V CDM is possible with the necessary precautions. Pins listed as ±2000 V may actually have higher performance. ESD Tested on SN74LS00N package.

## 6.3 Recommended Operating Conditions

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

| | | | MIN | NOM | MAX | UNIT |
|---|---|---|---|---|---|---|
| $V_{CC}$ | Supply voltage | SN54xx00 | 4.5 | 5 | 5.5 | V |
| | | SN74xx00 | 4.75 | 5 | 5.25 | |
| $V_{IH}$ | High-level input voltage | | 2 | | | V |
| $V_{IL}$ | Low-level input voltage | SNx400, SN7LS400, and SNx4S00 | | | 0.8 | V |
| | | SN54LS00 | | | 0.7 | |
| $I_{OH}$ | High-level output current | SN5400, SN54LS00, and SN74LS00 | | | –0.4 | mA |
| | | SNx4S00 | | | –1 | |
| $I_{OL}$ | Low-level output current | SNx400 | | | 16 | mA |
| | | SN5LS400 | | | 4 | |
| | | SN7LS400 | | | 8 | |
| | | SNx4S00 | | | 20 | |


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## Recommended Operating Conditions (continued)

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

| | | | MIN | NOM | MAX | UNIT |
|---|---|---|---|---|---|---|
| $T_A$ | Operating free-air temperature | SN54xx00 | –55 | | 125 | °C |
| | | SN74xx00 | 0 | | 70 | |

## 6.4 Thermal Information

| THERMAL METRIC[1][2] | | SN74LS00 | | | | UNIT |
|---|---|---|---|---|---|---|
| | | D (SOIC) | DB (SSOP) | N (PDIP) | NS (SO) | |
| | | 14 PINS | 14 PINS | 14 PINS | 14 PINS | |
| $R_{\theta JA}$ | Junction-to-ambient thermal resistance | 90.9 | 102.8 | 54.8 | 89.7 | °C/W |
| $R_{\theta JC(top)}$ | Junction-to-case (top) thermal resistance | 51.9 | 53.3 | 42.1 | 48.1 | °C/W |
| $R_{\theta JB}$ | Junction-to-board thermal resistance | 48 | 53.4 | 34.8 | 50.1 | °C/W |
| $\psi_{JT}$ | Junction-to-top characterization parameter | 18.6 | 16.5 | 26.9 | 16.7 | °C/W |
| $\psi_{JB}$ | Junction-to-board characterization parameter | 47.8 | 52.9 | 34.7 | 49.8 | °C/W |

(1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC Package Thermal Metrics* application report.
(2) The package thermal impedance is calculated in accordance with JESD 51-7.

## 6.5 Electrical Characteristics: SNx400

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

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

## 6.6 Electrical Characteristics: SNx4LS00

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

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

## 6.7 Electrical Characteristics: SNx4S00

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

| PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| $V_{IK}$ | $V_{CC}$ = MIN and $I_I$ = –18 mA | | | –1.2 | V |
| $V_{OH}$ | $V_{CC}$ = MIN, $V_{IL}$ = 0.8 V, and $I_{OH}$ = –1 mA | 2.5 | 3.4 | | V |
| $V_{OL}$ | $V_{CC}$ = MIN, $V_{IH}$ = 2 V, and $I_{OL}$ = 20 mA | | | 0.5 | V |
| $I_I$ | $V_{CC}$ = MAX and $V_I$ = 5.5 V | | | 1 | mA |
| $I_{IH}$ | $V_{CC}$ = MAX and $V_I$ = 2.7 V | | | 50 | µA |
| $I_{IL}$ | $V_{CC}$ = MAX and $V_I$ = 0.5 V | | | –2 | mA |


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## Electrical Characteristics: SNx4S00 (continued)

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

| PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| $I_{OS}$ | $V_{CC}$ = MAX | –40 | | –100 | mA |
| $I_{CCH}$ | $V_{CC}$ = MAX and $V_I$ = 0 V | | 10 | 16 | mA |
| $I_{CCL}$ | $V_{CC}$ = MAX and $V_I$ = 4.5 V | | 20 | 36 | mA |

## 6.8 Switching Characteristics: SNx400

$V_{CC}$ = 5 V, $T_A$ = 25°C, and over operating free-air temperature range (unless otherwise noted). See Figure 2.

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

## 6.9 Switching Characteristics: SNx4LS00

$V_{CC}$ = 5 V, $T_A$ = 25°C, and over operating free-air temperature range (unless otherwise noted). See Figure 2.

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| $t_{PLH}$ | A or B | Y | $R_L$ = 2 kΩ and $C_L$ = 15 pF | | 9 | 15 | ns |
| $t_{PHL}$ | | | | | 10 | 15 | |

## 6.10 Switching Characteristics: SNx4S00

$V_{CC}$ = 5 V, $T_A$ = 25°C, and over operating free-air temperature range (unless otherwise noted). See Figure 2.

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| $t_{PLH}$ | A or B | Y | $R_L$ = 280 Ω and $C_L$ = 15 pF | | 3 | 4.5 | ns |
| | | | $R_L$ = 280 Ω and $C_L$ = 50 pF | | 4.5 | | |
| $t_{PHL}$ | A or B | Y | $R_L$ = 280 Ω and $C_L$ = 15 pF | | 3 | 5 | |
| | | | $R_L$ = 280 Ω and $C_L$ = 50 pF | | 5 | | |

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## 6.11 Typical Characteristics

$C_L$ = 15 pF

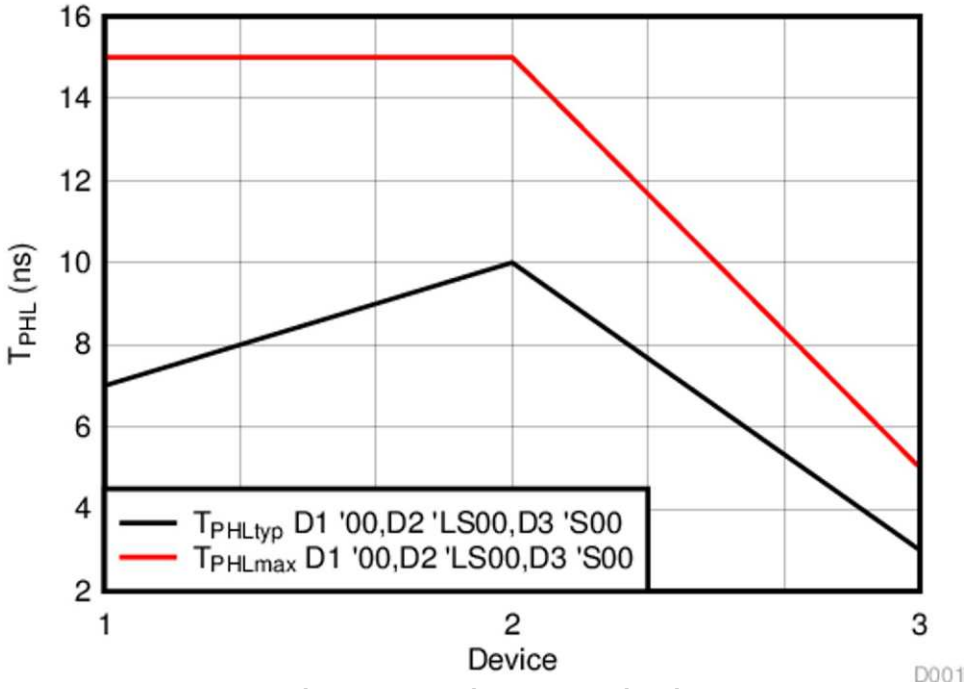


**Figure 1. $T_{PHL}$ (Across Devices)**


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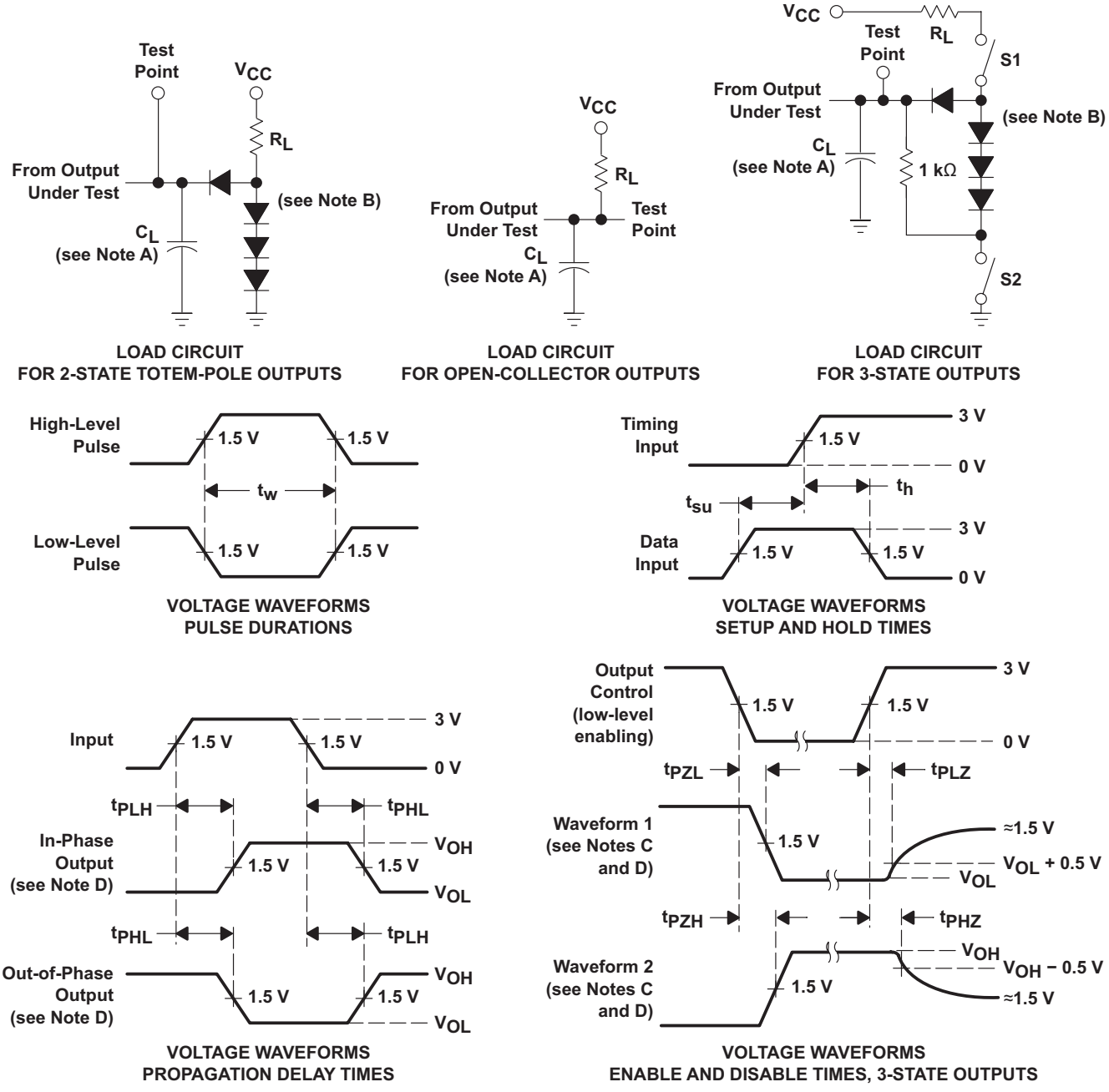
# 7 Parameter Measurement Information

## 7.1 Propagation Delays, Setup and Hold Times, and Pulse Width




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 ≤ 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 2. Load Circuits and Voltage Waveforms**

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# 8 Detailed Description

## 8.1 Overview

The SNx4xx00 devices are quadruple, 2-input NAND gates which perform the Boolean function $Y = \overline{A \cdot B}$ or $Y = \overline{A} + \overline{B}$ in positive logic.

## 8.2 Functional Block Diagram

## 8.3 Feature Description

The operating voltage of SN74xx00 is from 4.75-V to 5.25-V $V_{CC}$. The operating voltage of SN54xx00 is from 4.5-V to 5.5-V $V_{CC}$. The SN54xx00 devices are rated from –55°C to 125°C whereas SN74xx00 device are rated from 0°C to 70°C.

## 8.4 Device Functional Modes

Table 1 lists the functions of the devices.

**Table 1. Functional Table (Each Gate)**

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


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# 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. Customers should validate and test their design implementation to confirm system functionality.

## 9.1 Application Information

The SNx4xx00 devices are quadruple, 2-input NAND gate. A typical application of NAND gate can be as an error indicator as shown in Figure 3. If either of the sensor has an error, the error flag is high to indicate system error.

## 9.2 Typical Application

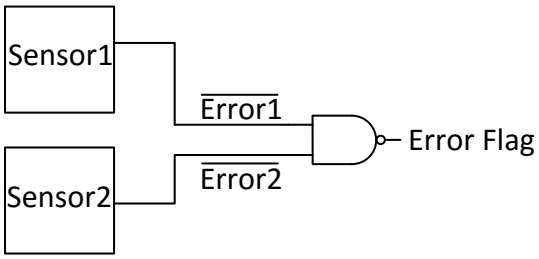


**Figure 3. Typical Application Diagram**

### 9.2.1 Design Requirements

These devices use BJT technology and have unbalanced output drive with $I_{OL}$ and $I_{OH}$ specified as per the *Recommended Operating Conditions*.

### 9.2.2 Detailed Design Procedure

- Recommended Input Conditions:
  - The inputs are TTL compliant.
  - Because the base-emitter junction at the inputs breaks down, no voltage greater than 5.5 V must be applied to the inputs.
  - Specified high and low levels: See $V_{IH}$ and $V_{IL}$ in *Recommended Operating Conditions*.
- Recommended Output Conditions:
  - No more than one output must be shorted at a time as per the *Electrical Characteristics: SNx400* for thermal stability and reliability.
  - For high-current applications, consider thermal characteristics of the package listed in *Thermal Information*.

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## Typical Application (continued)

### 9.2.3 Application Curve

$C_L$ = 15 pF

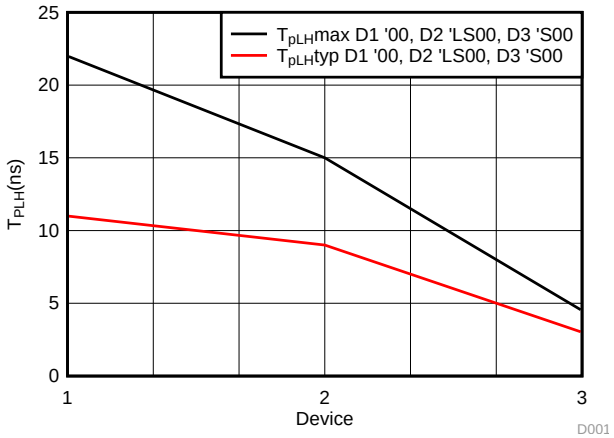


**Figure 4. $T_{PLH}$ (Across Devices)**

## 10 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in *Recommended Operating Conditions* for each of the SNx4LS00, SNx4S00, and SNx400 devices.

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


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# 11 Layout

## 11.1 Layout Guidelines

When using multiple bit logic, devices inputs must never float.

Devices with multiple-emitter inputs (SN74 and SN74S series) need special care. Because no voltage greater than 5.5 V must be applied to the inputs (if exceeded, the base-emitter junction at the inputs breaks down), the inputs of these devices must be connected to the supply voltage, $V_{CC}$, through series resistor, $R_S$ (see Figure 5). This resistor must be dimensioned such that the current flowing into the gate or gates, which results from overvoltage, does not exceed 1 mA. However, because the high-level input current of the circuits connected to the gate flows through this resistor, the resistor must be dimensioned so that the voltage drop across it still allows the required high level. Equation 1 and Equation 2 are for dimensioning resistor, $R_S$, and several inputs can be connected to a high level through a single resistor if the following conditions are met.

$$R_{S(min)} \frac{V_{CCP} \ 5.5 \ V}{1 \, mA} \quad (1)$$

$$R_{S(max)} \frac{V_{CC(min)} \ 2.4 \ V}{n \, I_{IH}} \quad (2)$$

where

- n = number of inputs connected
- $I_{IH}$ = high input current (typical 40 µA)
- $V_{CC(min)}$ = minimum supply voltage, $V_{CC}$
- $V_{CCP}$ = maximum peak voltage of the supply voltage, $V_{CC}$ (about 7 V)

## 11.2 Layout Example

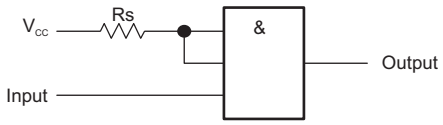


**Figure 5. Series Resistor Connected to Unused Inputs of Multiple-Emitter Transistors**

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# 12 Device and Documentation Support

## 12.1 Documentation Support

### 12.1.1 Related Documentation

For related documentation see the following:

*Designing With Logic* (SDYA009)

## 12.2 Related Links

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 2. Related Links**

| PARTS | PRODUCT FOLDER | SAMPLE & BUY | TECHNICAL DOCUMENTS | TOOLS & SOFTWARE | SUPPORT & COMMUNITY |
|---|---|---|---|---|---|
| SN5400 | Click here | Click here | Click here | Click here | Click here |
| SN54LS00 | Click here | Click here | Click here | Click here | Click here |
| SN54S00 | Click here | Click here | Click here | Click here | Click here |
| SN7400 | Click here | Click here | Click here | Click here | Click here |
| SN74LS00 | Click here | Click here | Click here | Click here | Click here |
| SN74S00 | Click here | Click here | Click here | Click here | Click here |

## 12.3 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. In the upper right corner, click on *Alert me* 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.

## 12.4 Community Resources

The following links connect to TI community resources. Linked contents are 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.

**TI E2E™ Online Community** ***TI's Engineer-to-Engineer (E2E) Community.*** Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

**Design Support** ***TI's Design Support*** Quickly find helpful E2E forums along with design support tools and contact information for technical support.

## 12.5 Trademarks

E2E is a trademark of Texas Instruments.
All other trademarks are the property of their respective owners.

## 12.6 Electrostatic Discharge Caution

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

## 12.7 Glossary

SLYZ022 — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.


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## 13 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.

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## 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) |
|---|---|---|---|---|---|---|---|---|---|
| JM38510/00104BCA | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 00104BCA |
| JM38510/00104BCA.A | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 00104BCA |
| JM38510/00104BDA | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 00104BDA |
| JM38510/00104BDA.A | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 00104BDA |
| JM38510/07001BCA | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07001BCA |
| JM38510/07001BCA.A | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07001BCA |
| JM38510/07001BDA | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07001BDA |
| JM38510/07001BDA.A | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07001BDA |
| JM38510/30001B2A | Active | Production | LCCC (FK) \| 20 | 55 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30001B2A |
| JM38510/30001B2A.A | Active | Production | LCCC (FK) \| 20 | 55 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30001B2A |
| JM38510/30001BCA | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30001BCA |
| JM38510/30001BCA.A | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30001BCA |
| JM38510/30001BDA | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30001BDA |
| JM38510/30001BDA.A | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30001BDA |
| JM38510/30001SCA | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/30001S CA |
| JM38510/30001SCA.A | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/30001S CA |

| 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) |
|---|---|---|---|---|---|---|---|---|---|
| JM38510/30001SDA | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/30001SDA |
| JM38510/30001SDA.A | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/30001SDA |
| M38510/00104BCA | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/00104BCA |
| M38510/00104BDA | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/00104BDA |
| M38510/07001BCA | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/07001BCA |
| M38510/07001BDA | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/07001BDA |
| M38510/30001B2A | Active | Production | LCCC (FK) \| 20 | 55 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/30001B2A |
| M38510/30001BCA | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/30001BCA |
| M38510/30001BDA | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/30001BDA |
| M38510/30001SCA | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/30001SCA |
| M38510/30001SDA | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/30001SDA |
| SN5400J | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN5400J |
| SN5400J.A | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN5400J |
| SN54LS00J | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54LS00J |
| SN54LS00J.A | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54LS00J |
| SN54S00J | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54S00J |
| SN54S00J.A | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54S00J |
| SN7400D | Active | Production | SOIC (D) \| 14 | 50 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 7400 |
| SN7400D.A | Active | Production | SOIC (D) \| 14 | 50 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 7400 |
| SN7400DG4 | Active | Production | SOIC (D) \| 14 | 50 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 7400 |
| SN7400N | Active | Production | PDIP (N) \| 14 | 25 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN7400N |
| SN7400N.A | Active | Production | PDIP (N) \| 14 | 25 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN7400N |
| SN7400NE4 | Active | Production | PDIP (N) \| 14 | 25 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN7400N |

| 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) |
|---|---|---|---|---|---|---|---|---|---|
| SN74LS00DBR | Active | Production | SSOP (DB) \| 14 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS00 |
| SN74LS00DBR.A | Active | Production | SSOP (DB) \| 14 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS00 |
| SN74LS00DR | Active | Production | SOIC (D) \| 14 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS00 |
| SN74LS00DR.A | Active | Production | SOIC (D) \| 14 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS00 |
| SN74LS00N | Active | Production | PDIP (N) \| 14 | 25 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN74LS00N |
| SN74LS00N.A | Active | Production | PDIP (N) \| 14 | 25 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN74LS00N |
| SN74LS00NE4 | Active | Production | PDIP (N) \| 14 | 25 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN74LS00N |
| SN74LS00NS | Obsolete | Production | SOP (NS) \| 14 | - | - | Call TI | Call TI | 0 to 70 | 74LS00 |
| SN74LS00NSR | Active | Production | SOP (NS) \| 14 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 74LS00 |
| SN74LS00NSR.A | Active | Production | SOP (NS) \| 14 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 74LS00 |
| SN74LS00NSRG4 | Active | Production | SOP (NS) \| 14 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 74LS00 |
| SN74LS00PSR | NRND | Production | SO (PS) \| 8 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS00 |
| SN74LS00PSR.A | NRND | Production | SO (PS) \| 8 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS00 |
| SN74S00D | Last Time Buy | Production | SOIC (D) \| 14 | 50 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | S00 |
| SN74S00D.A | Last Time Buy | Production | SOIC (D) \| 14 | 50 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | S00 |
| SN74S00N | Active | Production | PDIP (N) \| 14 | 25 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN74S00N |
| SN74S00N.A | Active | Production | PDIP (N) \| 14 | 25 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN74S00N |
| SNJ5400J | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ5400J |
| SNJ5400J.A | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ5400J |
| SNJ5400W | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ5400W |
| SNJ5400W.A | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ5400W |
| SNJ54LS00FK | Active | Production | LCCC (FK) \| 20 | 55 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS00FK |
| SNJ54LS00FK.A | Active | Production | LCCC (FK) \| 20 | 55 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS00FK |
| SNJ54LS00J | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS00J |
| SNJ54LS00J.A | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS00J |
| SNJ54LS00W | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS00W |
| SNJ54LS00W.A | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS00W |
| SNJ54S00FK | Active | Production | LCCC (FK) \| 20 | 55 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54S 00FK |

| 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) |
|---|---|---|---|---|---|---|---|---|---|
| SNJ54S00FK.A | Active | Production | LCCC (FK) \| 20 | 55 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54S 00FK |
| SNJ54S00J | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54S00J |
| SNJ54S00J.A | Active | Production | CDIP (J) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54S00J |
| SNJ54S00W | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54S00W |
| SNJ54S00W.A | Active | Production | CFP (W) \| 14 | 25 \| TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54S00W |

(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.

**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 SN5400, SN54LS00, SN54LS00-SP, SN54S00, SN7400, SN74LS00, SN74S00 :**

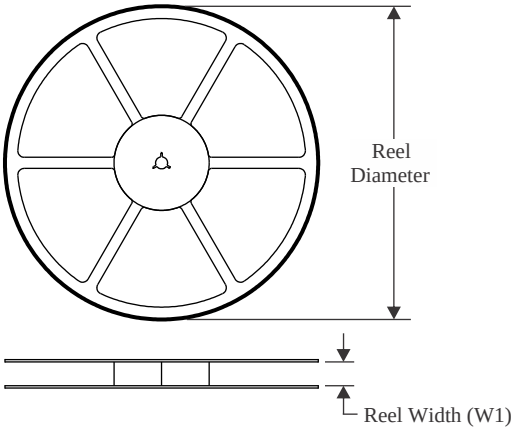
- Catalog : SN7400, SN74LS00, SN54LS00, SN74S00
- Military : SN5400, SN54LS00, SN54S00
- Space : SN54LS00-SP

NOTE: Qualified Version Definitions:

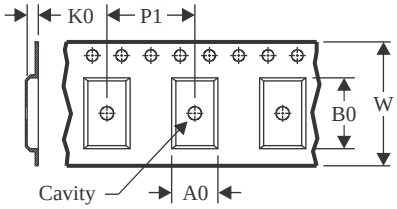
- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications
- Space - Radiation tolerant, ceramic packaging and qualified for use in Space-based application

## TAPE AND REEL INFORMATION

**REEL DIMENSIONS**

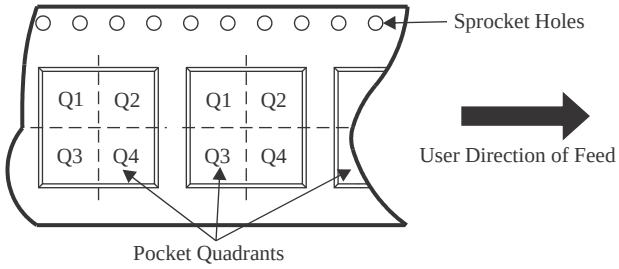



**TAPE DIMENSIONS**




| | |
|---|---|
| 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 |

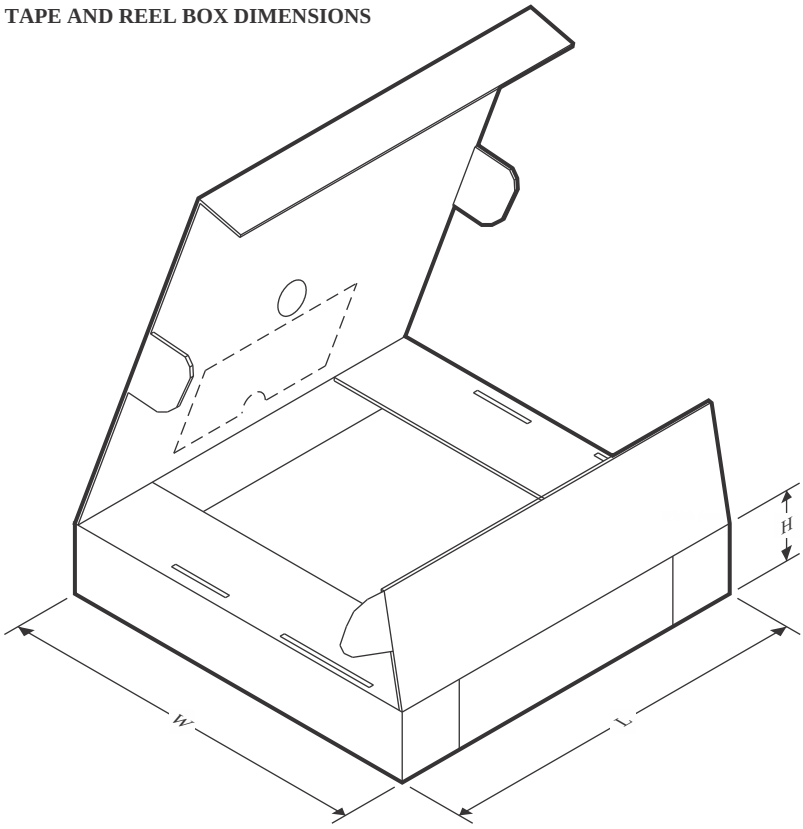
**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**




*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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SN74LS00DBR | SSOP | DB | 14 | 2000 | 330.0 | 16.4 | 8.35 | 6.6 | 2.4 | 12.0 | 16.0 | Q1 |
| SN74LS00DR | SOIC | D | 14 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| SN74LS00NSR | SOP | NS | 14 | 2000 | 330.0 | 16.4 | 8.1 | 10.4 | 2.5 | 12.0 | 16.0 | Q1 |
| SN74LS00PSR | SO | PS | 8 | 2000 | 330.0 | 16.4 | 8.35 | 6.6 | 2.4 | 12.0 | 16.0 | Q1 |

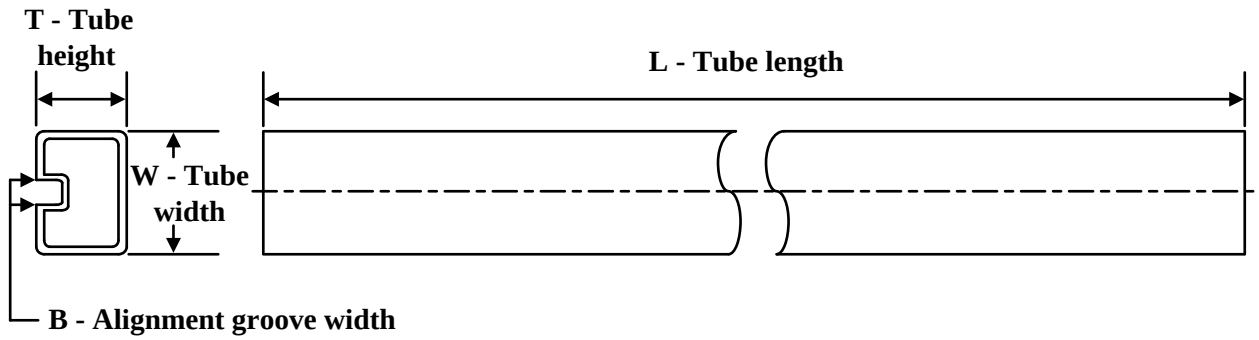
TAPE AND REEL BOX DIMENSIONS




*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---|---|---|---|---|---|---|---|
| SN74LS00DBR | SSOP | DB | 14 | 2000 | 353.0 | 353.0 | 32.0 |
| SN74LS00DR | SOIC | D | 14 | 2500 | 353.0 | 353.0 | 32.0 |
| SN74LS00NSR | SOP | NS | 14 | 2000 | 353.0 | 353.0 | 32.0 |
| SN74LS00PSR | SO | PS | 8 | 2000 | 353.0 | 353.0 | 32.0 |

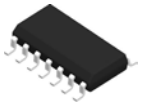
## TUBE




*All dimensions are nominal

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (µm) | B (mm) |
|---|---|---|---|---|---|---|---|---|
| JM38510/00104BDA | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| JM38510/00104BDA.A | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| JM38510/07001BDA | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| JM38510/07001BDA.A | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| JM38510/30001BDA | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| JM38510/30001BDA.A | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| JM38510/30001SDA | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| JM38510/30001SDA.A | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| M38510/00104BDA | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| M38510/07001BDA | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| M38510/30001BDA | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| M38510/30001SDA | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| SN7400D | D | SOIC | 14 | 50 | 506.6 | 8 | 3940 | 4.32 |
| SN7400D.A | D | SOIC | 14 | 50 | 506.6 | 8 | 3940 | 4.32 |
| SN7400DG4 | D | SOIC | 14 | 50 | 506.6 | 8 | 3940 | 4.32 |
| SN7400N | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN7400N | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN7400N.A | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN7400N.A | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN7400NE4 | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN7400NE4 | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74LS00N | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74LS00N.A | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74LS00NE4 | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74S00D | D | SOIC | 14 | 50 | 506.6 | 8 | 3940 | 4.32 |
| SN74S00D.A | D | SOIC | 14 | 50 | 506.6 | 8 | 3940 | 4.32 |
| SN74S00N | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74S00N | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74S00N.A | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (µm) | B (mm) |
|---|---|---|---|---|---|---|---|---|
| SN74S00N.A | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SNJ5400W | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| SNJ5400W.A | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| SNJ54LS00FK | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |
| SNJ54LS00FK.A | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |
| SNJ54LS00W | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| SNJ54LS00W.A | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| SNJ54S00FK | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |
| SNJ54S00FK.A | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |

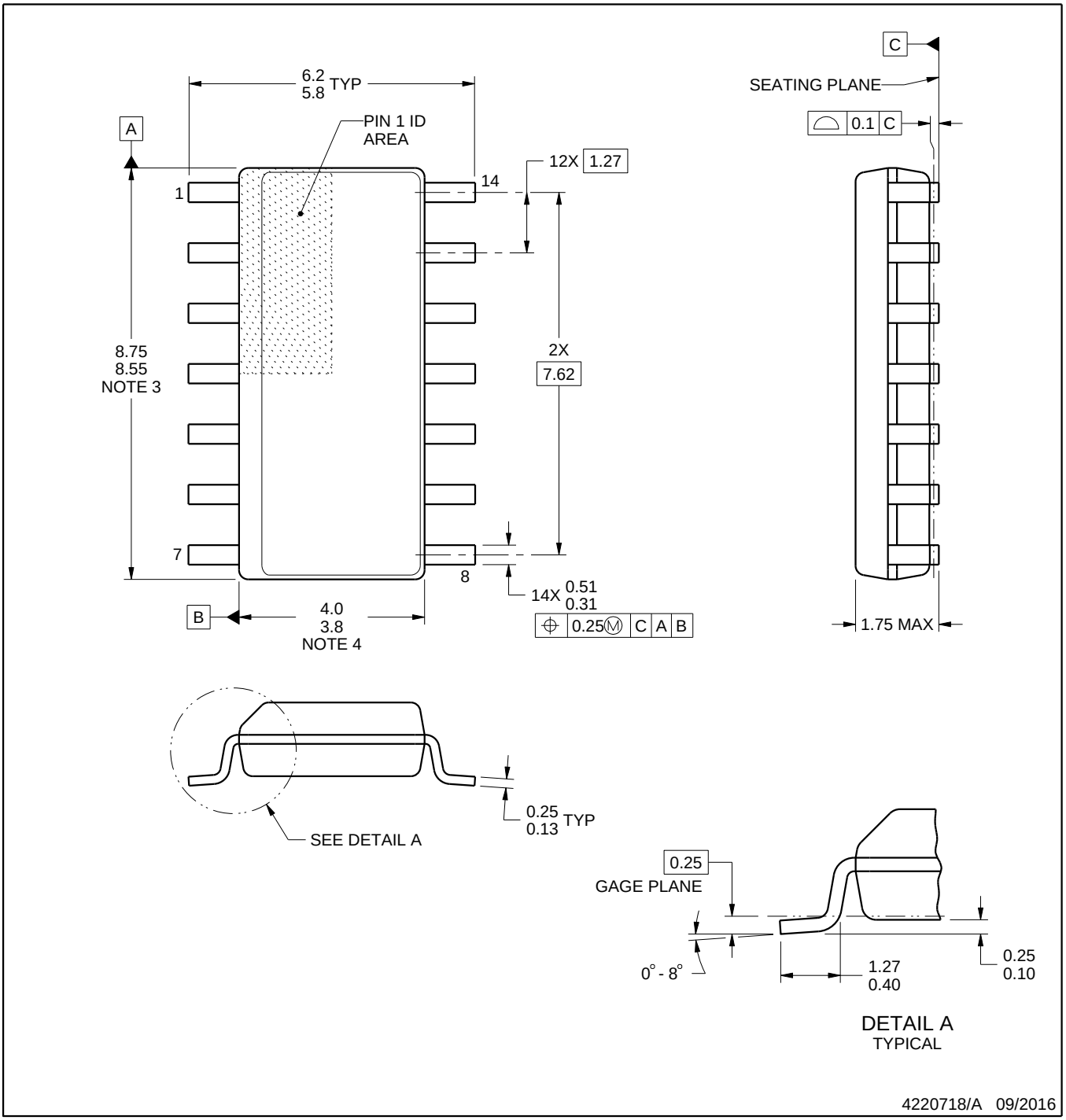


# PACKAGE OUTLINE

## D0014A

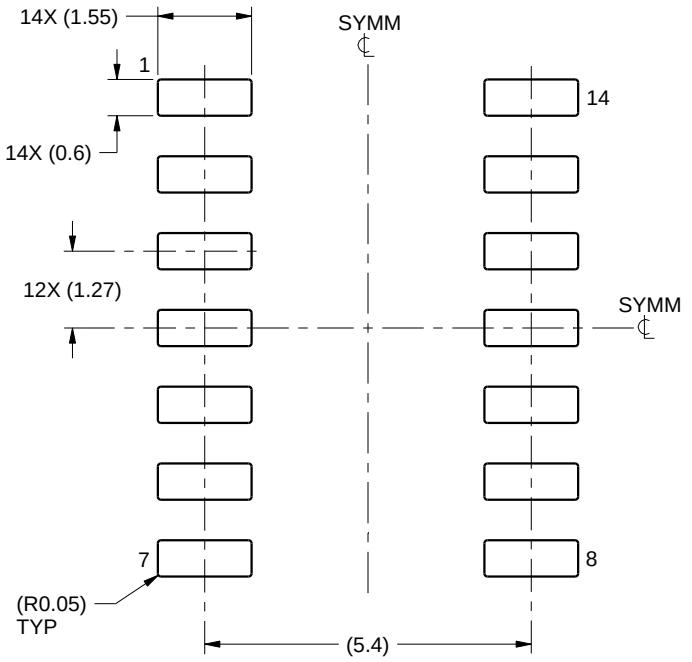
## SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

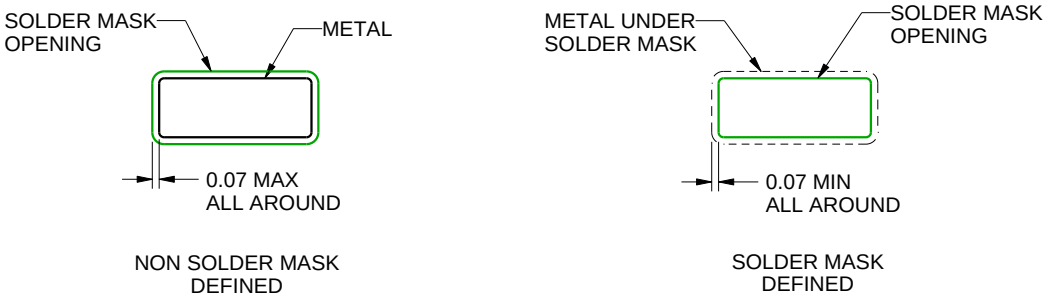



NOTES:

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.




LAND PATTERN EXAMPLE
SCALE:8X




SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

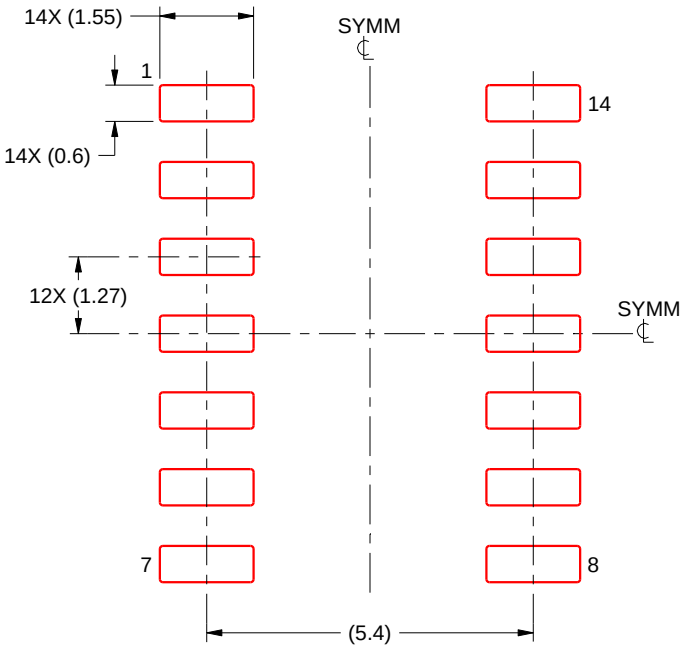
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# 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

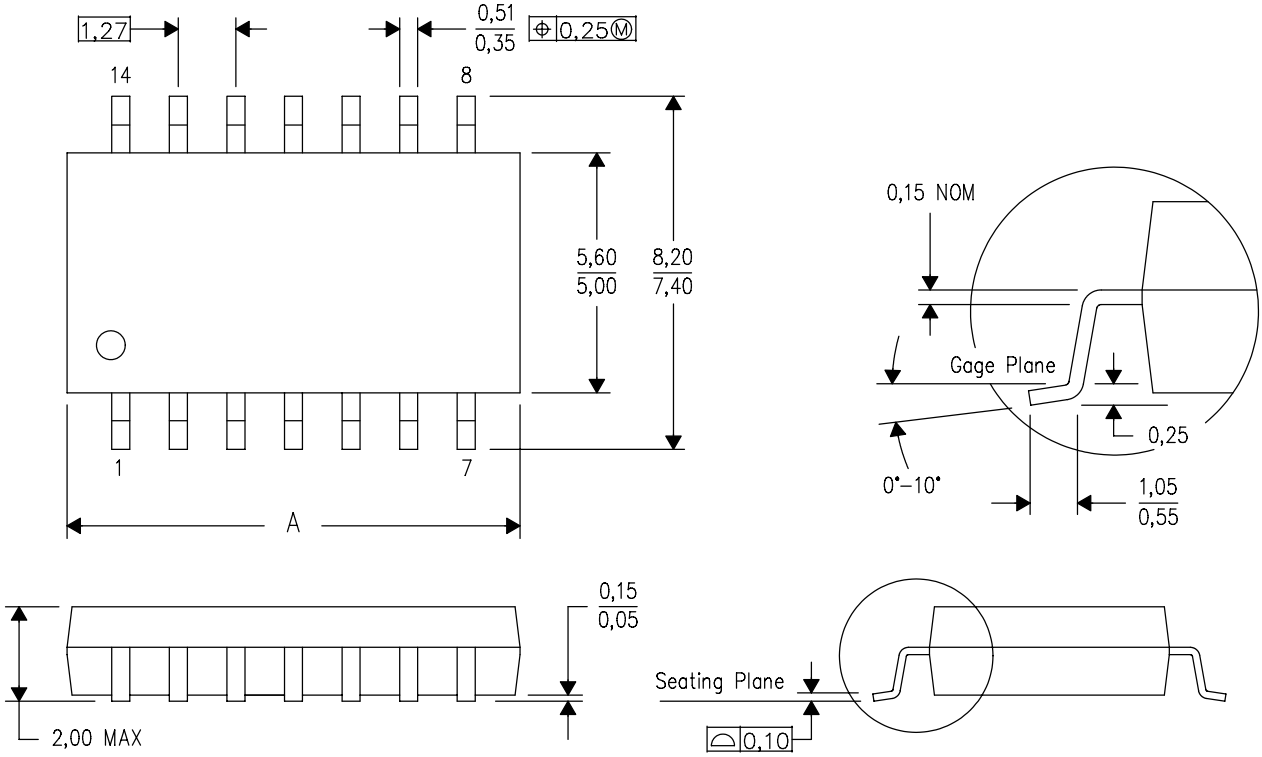
NOTES: (continued)

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**

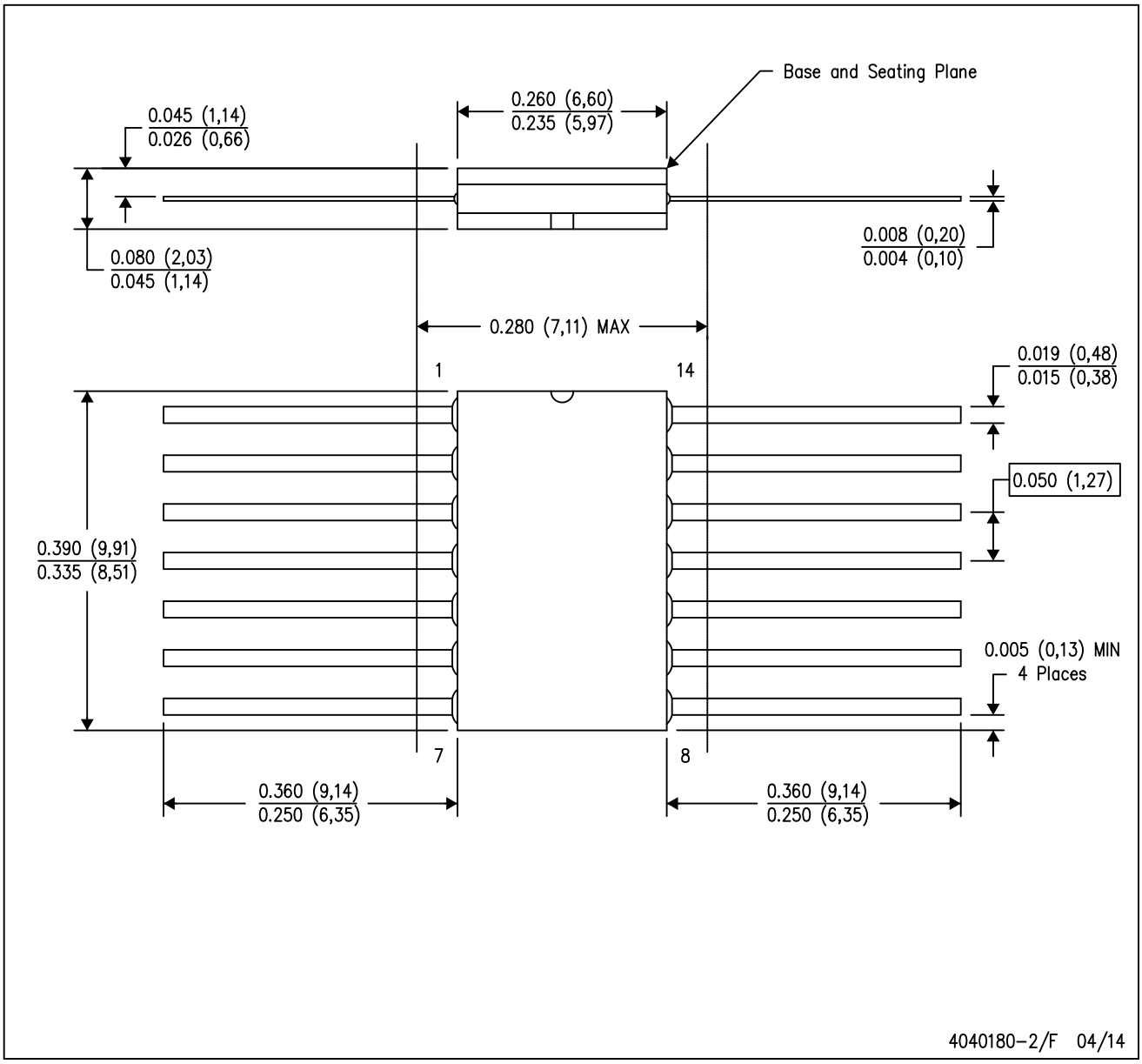



| DIM \ PINS ** | 14 | 16 | 20 | 24 |
|---|---|---|---|---|
| A MAX | 10,50 | 10,50 | 12,90 | 15,30 |
| A MIN | 9,90 | 9,90 | 12,30 | 14,70 |

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.

W (R–GDFP–F14) CERAMIC DUAL FLATPACK



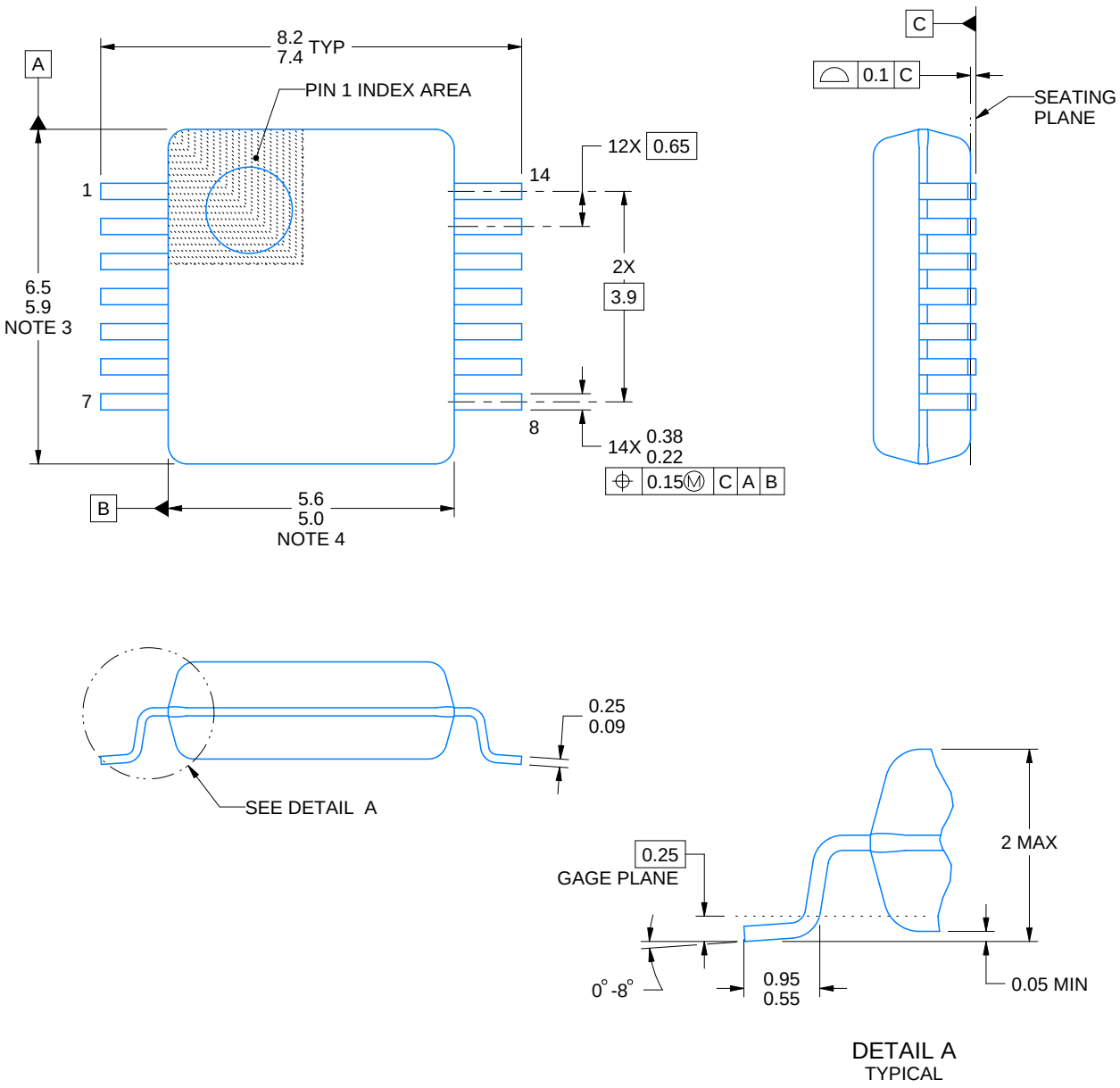

NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification only.
E. Falls within MIL STD 1835 GDFP1–F14

# PACKAGE OUTLINE

## DB0014A

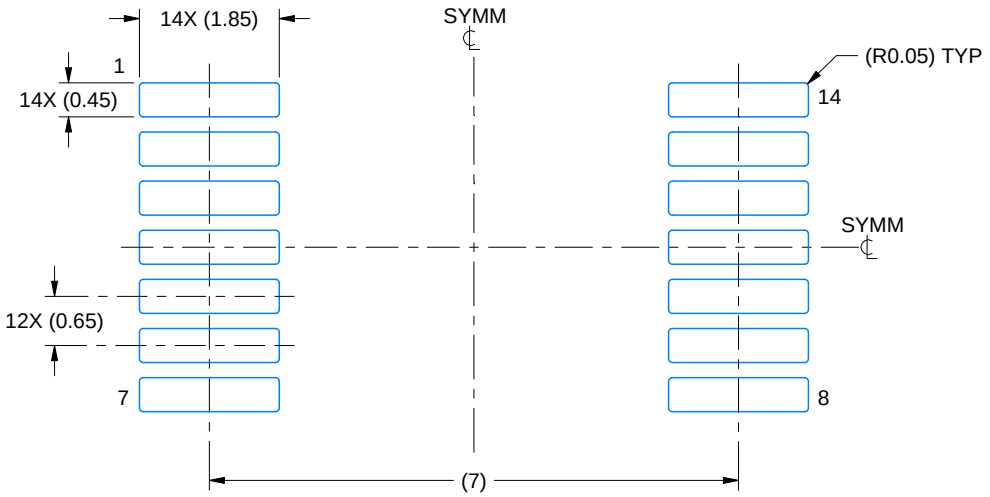
## SSOP - 2 mm max height

SMALL OUTLINE PACKAGE

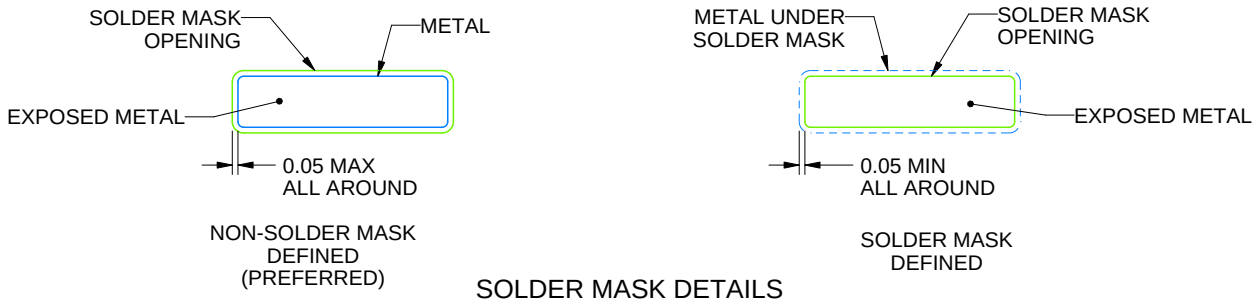



NOTES:

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. Reference JEDEC registration MO-150.




LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X

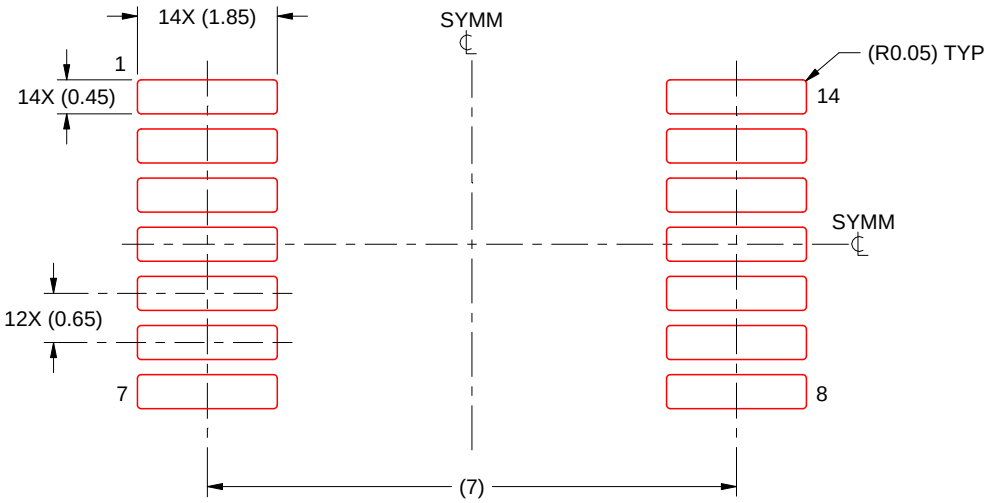



SOLDER MASK DETAILS

4220762/A 05/2024

NOTES: (continued)

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




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

4220762/A 05/2024

NOTES: (continued)

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

# GENERIC PACKAGE VIEW

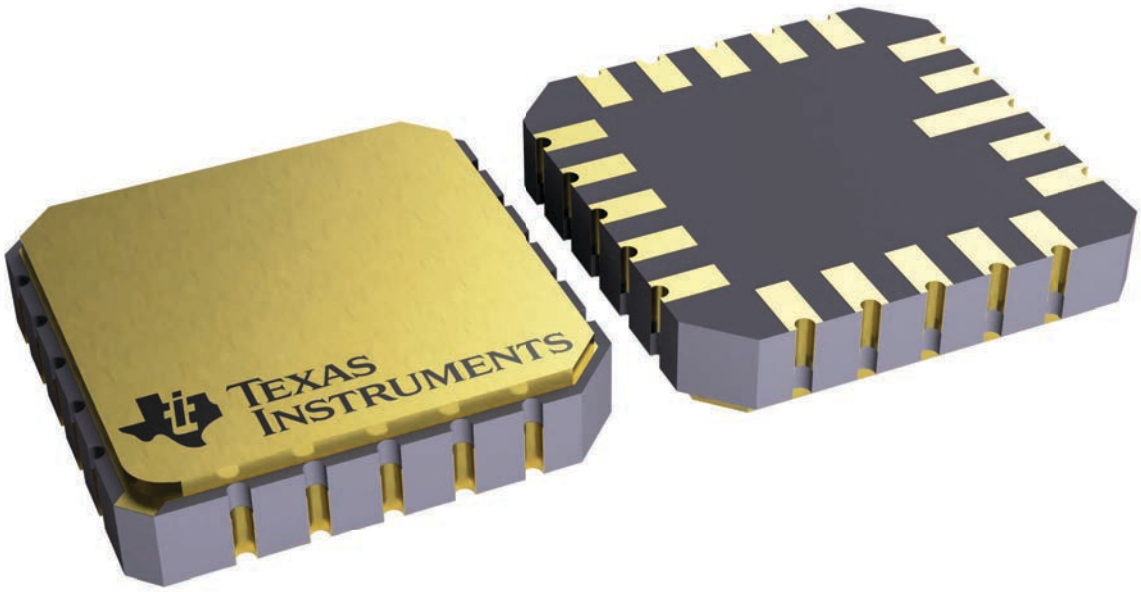
## FK 20

## 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.

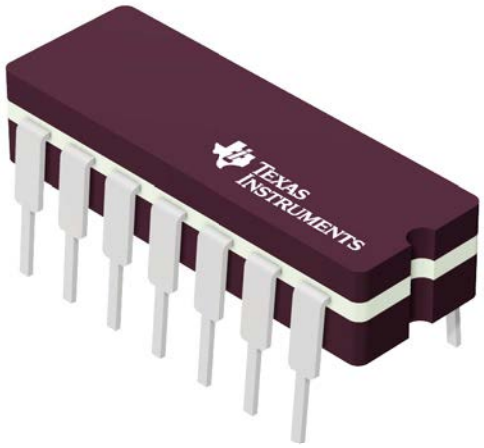



4229370VA\

# GENERIC PACKAGE VIEW

## J 14 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.

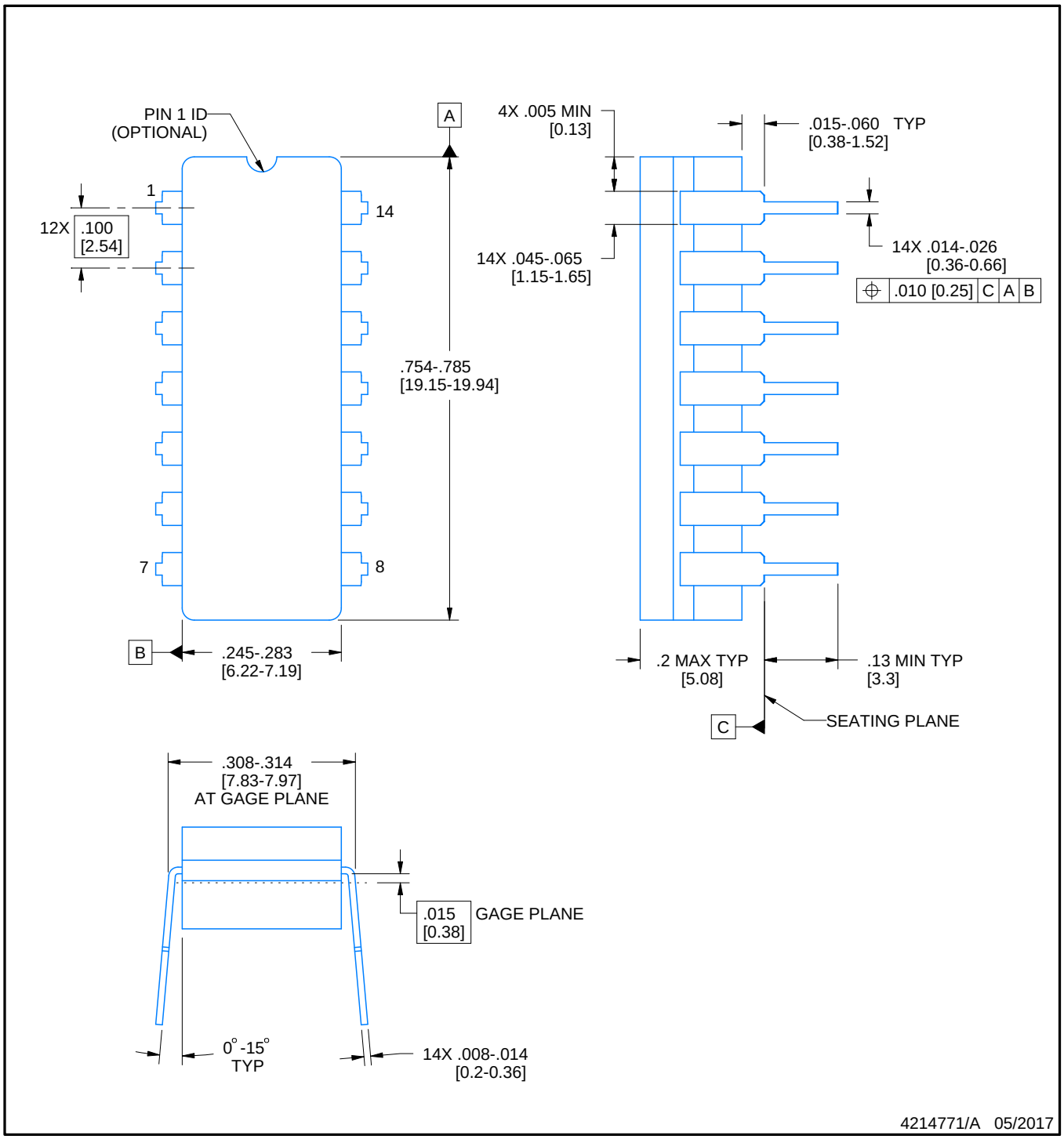
4040083-5/G

# PACKAGE OUTLINE

## J0014A

## CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE




NOTES:

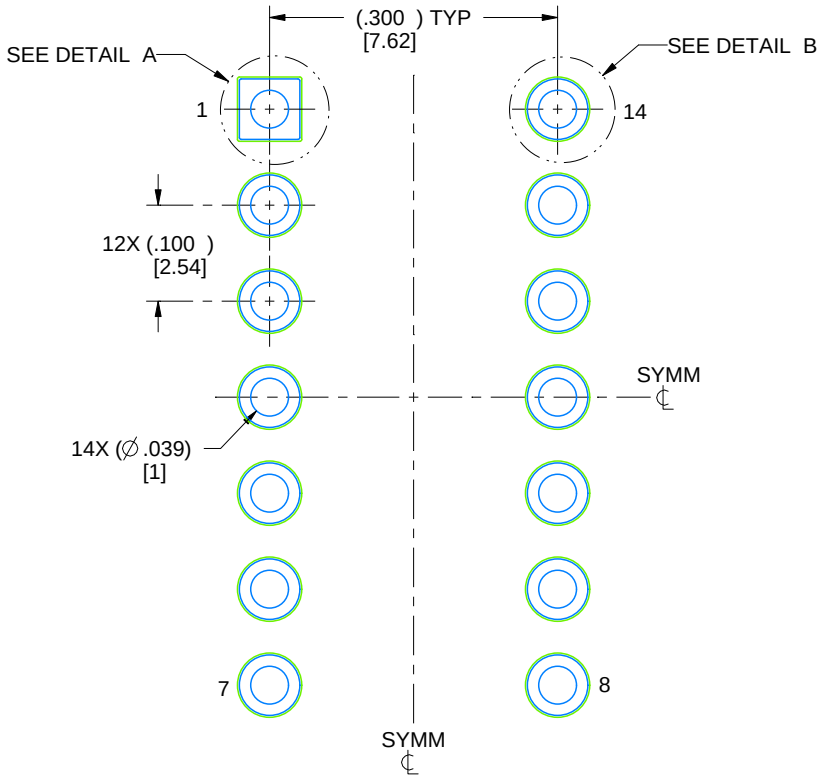
1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermitically sealed with 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

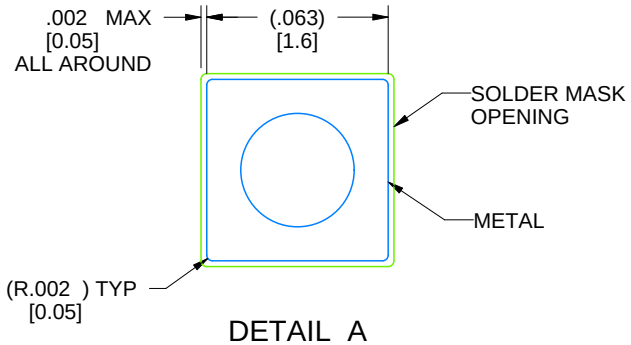
## J0014A

## CDIP - 5.08 mm max height

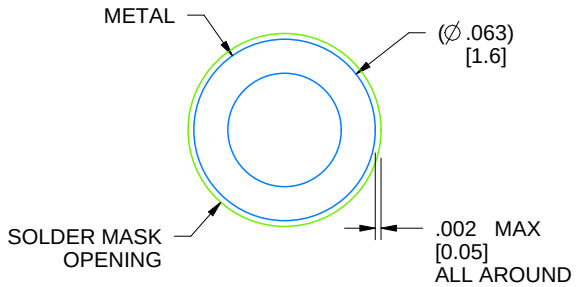
CERAMIC DUAL IN LINE PACKAGE




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




DETAIL A
SCALE: 15X

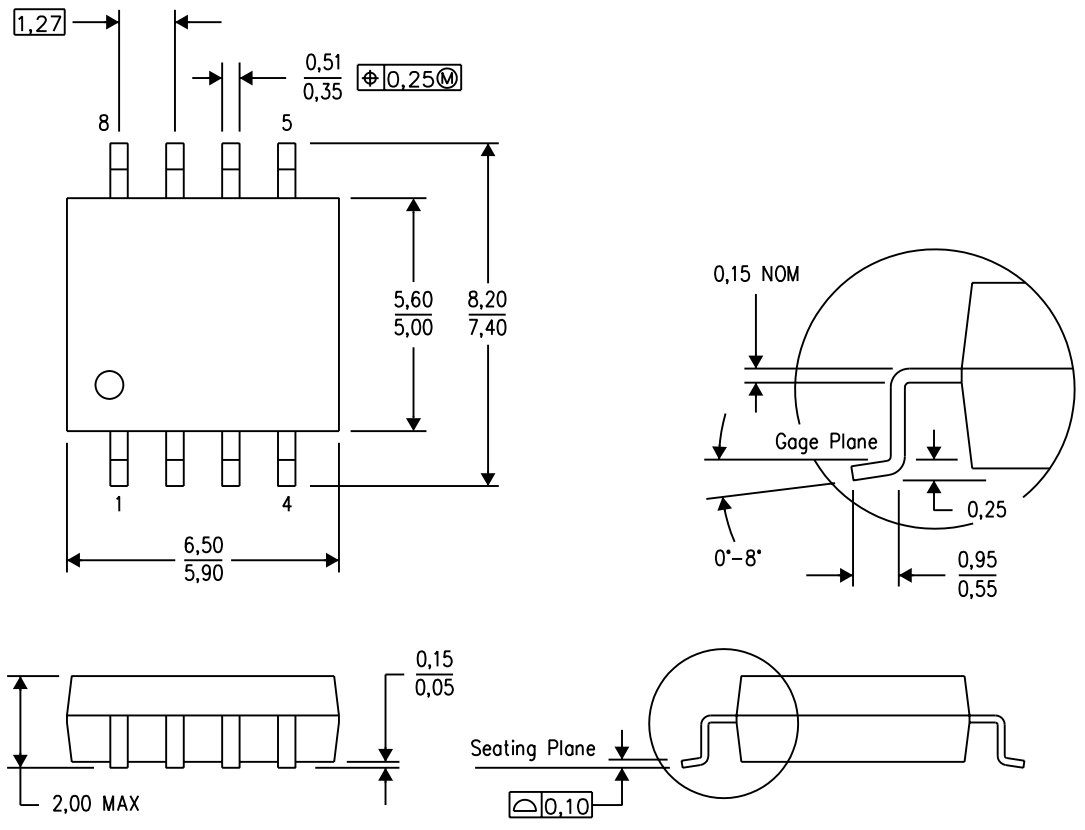



DETAIL B
13X, SCALE: 15X

4214771/A 05/2017

## MECHANICAL DATA

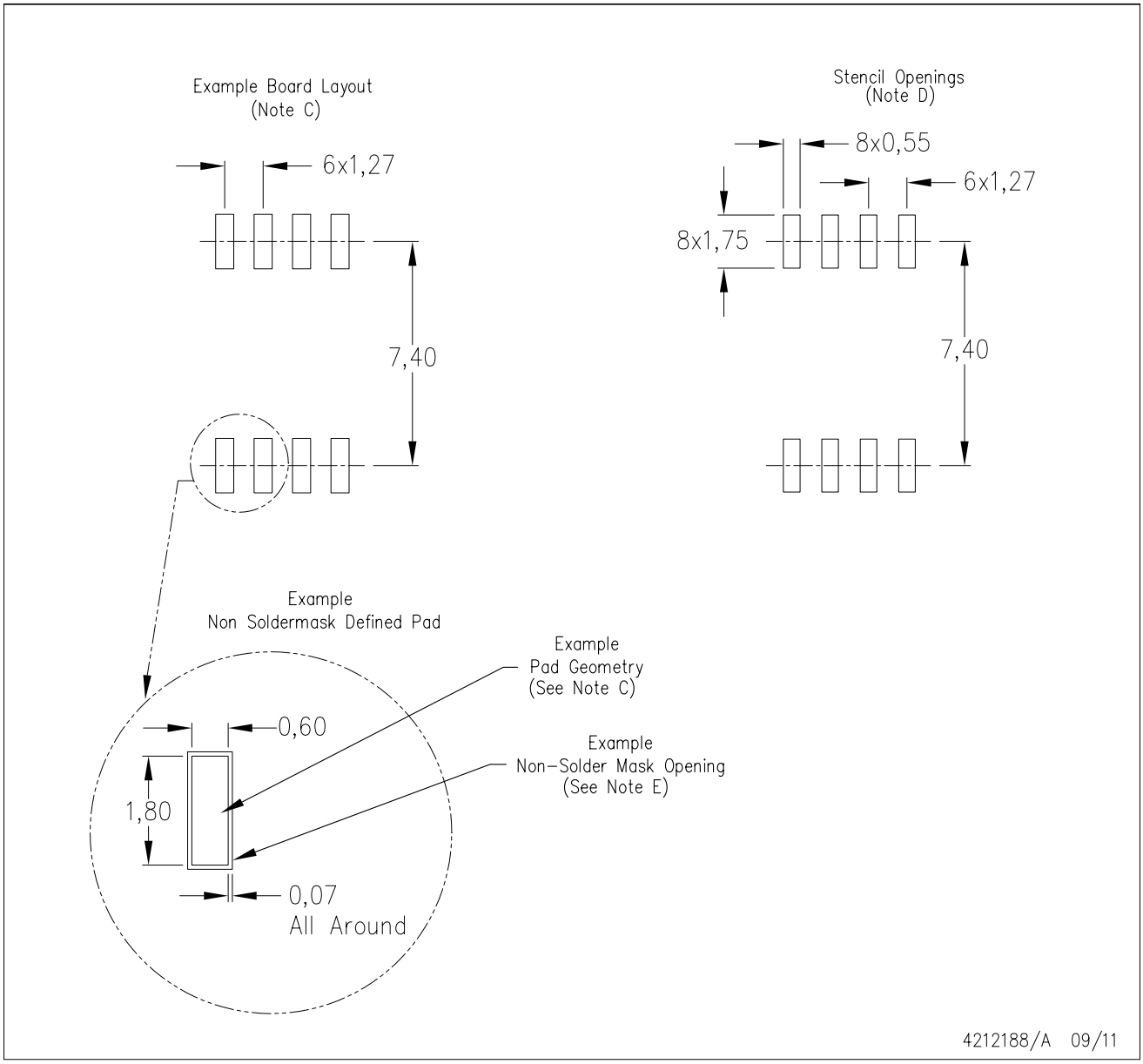
**PS (R-PDSO-G8)** **PLASTIC SMALL-OUTLINE PACKAGE**




4040063/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.

PS (R–PDSO–G8) PLASTIC SMALL OUTLINE

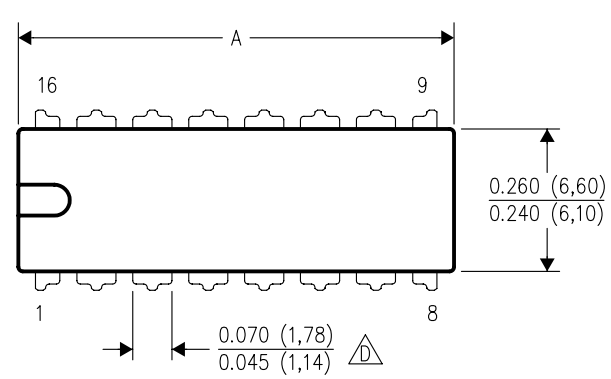



NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Publication IPC–7351 is recommended for alternate designs.
D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact 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.

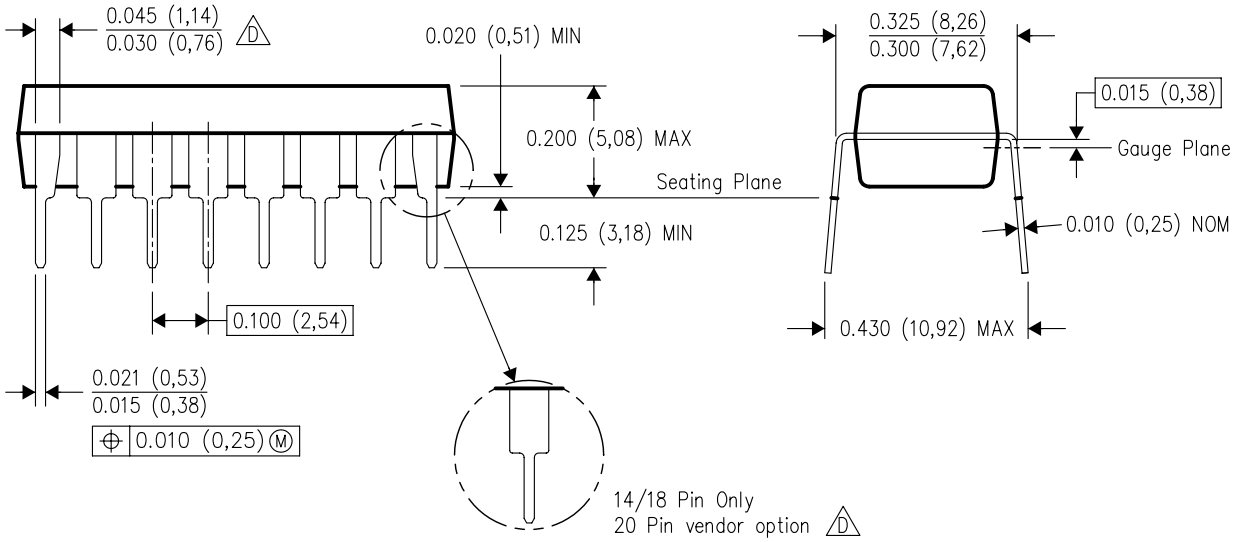
## N (R–PDIP–T**)

## PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN




| DIM \ PINS ** | 14 | 16 | 18 | 20 |
|---|---|---|---|---|
| A MAX | 0.775 (19,69) | 0.775 (19,69) | 0.920 (23,37) | 1.060 (26,92) |
| A MIN | 0.745 (18,92) | 0.745 (18,92) | 0.850 (21,59) | 0.940 (23,88) |
| MS–001 VARIATION (C) | AA | BB | AC | AD |




4040049/E 12/2002

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.

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