

# SN54128, SN74128 LINE DRIVERS

SDLS045

DECEMBER 1983 — REVISED MARCH 1988

- Package Options Include Plastic and Ceramic DIPs and Ceramic Flat Packages
- Dependable Texas Instruments Quality and Reliability

## description

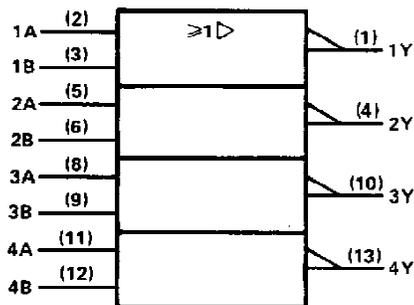
These devices contain four independent 2-input-NOR line drivers. They perform the Boolean function  $Y = \overline{A + B}$  or  $Y = \overline{A} \cdot \overline{B}$ . The SN54128 is designed to drive 75 ohm lines. The SN74128 is designed to drive 50 ohm lines.

The SN54128 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74128 is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

## logic diagram (each driver)



## logic symbol†



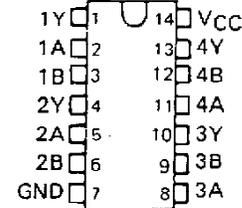
†This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

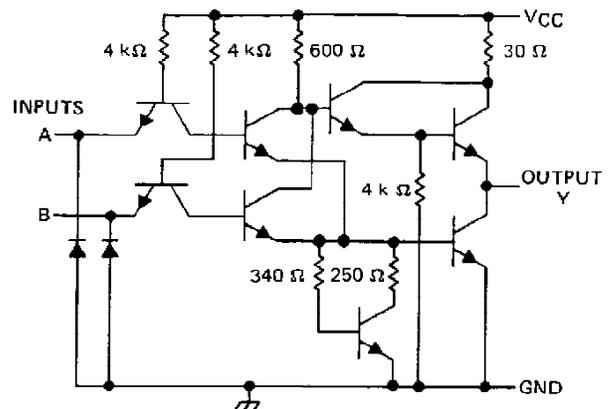
|   |  |
|---|--|
| Supply voltage, $V_{CC}$ (see Note 1)       | 7 V  |
| Input voltage                               | 5.5 V  |
| Operating free-air temperature range: SN54' | $-55^{\circ}\text{C}$ to $125^{\circ}\text{C}$ |
| SN74'                                       | $0^{\circ}\text{C}$ to $70^{\circ}\text{C}$    |
| Storage temperature range                   | $-65^{\circ}\text{C}$ to $150^{\circ}\text{C}$ |

NOTE 1: Voltage values are with respect to network ground terminal.

SN54128 . . . J OR W PACKAGE  
SN74128 . . . N PACKAGE  
(TOP VIEW)



## schematic (each driver)



Resistor values shown are nominal.

PRODUCTION DATA documents contain information 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 655012 • DALLAS, TEXAS 75265

# SN54128, SN74128 LINE DRIVERS

## recommended operating conditions

|                 |                                | SN54128 |     |     | SN74128 |     |       | UNIT |
|-----------------|--------------------------------|---------|-----|-----|---------|-----|-------|------|
|                 |                                | MIN     | NOM | MAX | MIN     | NOM | MAX   |      |
| V <sub>CC</sub> | Supply voltage                 | 4.5     | 5   | 5.5 | 4.75    | 5   | 5.25  | V    |
| V <sub>IH</sub> | High-level input voltage       | 2       |     |     | 2       |     |       | V    |
| V <sub>IL</sub> | Low-level input voltage        |         |     | 0.8 |         |     | 0.8   | V    |
| I <sub>OH</sub> | High-level output current      |         |     | -29 |         |     | -42.4 | mA   |
| I <sub>OL</sub> | Low-level output current       |         |     | 48  |         |     | 48    | mA   |
| T <sub>A</sub>  | Operating free-air temperature | -55     |     | 125 | 0       |     | 70    | °C   |

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

| PARAMETER         | TEST CONDITIONS †  | MIN | TYP ‡ | MAX  | UNIT |
|-------------------|--|-----|-------|------|------|
| V <sub>IK</sub>   | V <sub>CC</sub> = MIN, I <sub>I</sub> = -12 mA                             |     |       | -1.5 | V    |
| V <sub>OH</sub>   | V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.8 V, I <sub>OH</sub> = -2.4 mA  | 2.4 | 3.4   |      | V    |
|                   | V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.4 V, I <sub>OH</sub> = -13.2 mA | 2.4 |       |      |      |
|                   | V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.4 V, I <sub>OH</sub> = MAX      | 2   |       |      |      |
| V <sub>OL</sub>   | V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, I <sub>OL</sub> = 48 mA      |     | 0.26  | 0.4  | V    |
| I <sub>I</sub>    | V <sub>CC</sub> = MAX, V <sub>I</sub> = 5.5 V                              |     |       | 1    | mA   |
| I <sub>IH</sub>   | V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.4 V                              |     |       | 40   | μA   |
| I <sub>IL</sub>   | V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V                              |     |       | -1.6 | mA   |
| I <sub>OS</sub> § | V <sub>CC</sub> = MAX  | -70 |       | -180 | mA   |
| I <sub>CCH</sub>  | V <sub>CC</sub> = MAX  |     | 12    | 21   | mA   |
| I <sub>CCL</sub>  | V <sub>CC</sub> = MAX  |     | 33    | 57   | mA   |

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

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

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

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

| PARAMETER        | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS                                 | MIN | TYP | MAX | UNIT |
|------------------|--------------|-------------|---|-----|-----|-----|------|
| t <sub>PLH</sub> | A or B       | Y           | R <sub>L</sub> = 133 Ω, C <sub>L</sub> = 50 pF  | 6   |     | 9   | ns   |
| t <sub>PHL</sub> |              |             |   | 8   |     | 12  | ns   |
| t <sub>PLH</sub> |              |             | R <sub>L</sub> = 133 Ω, C <sub>L</sub> = 150 pF | 10  |     | 15  | ns   |
| t <sub>PHL</sub> |              |             |   | 12  |     | 18  | ns   |

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

TEXAS  
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POST OFFICE BOX 655012 • DALLAS, TEXAS 75265

**PACKAGING INFORMATION**

| Orderable part number           | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6)              |
|---------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|----------------------------------|
| <a href="#">5962-9861101QCA</a> | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9861101QC<br>A<br>SNJ54128J |
| <a href="#">5962-9861101QDA</a> | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9861101QD<br>A<br>SNJ54128W |
| <a href="#">5962-9861101QDA</a> | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9861101QD<br>A<br>SNJ54128W |
| <a href="#">SN54128J</a>        | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54128J                         |
| <a href="#">SN54128J</a>        | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54128J                         |
| SN54128J.A                      | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54128J                         |
| SN54128J.A                      | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54128J                         |
| <a href="#">SN74128D</a>        | Active        | Production           | SOIC (D)   14  | 50   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74128                            |
| <a href="#">SN74128D</a>        | Active        | Production           | SOIC (D)   14  | 50   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74128                            |
| SN74128D.A                      | Active        | Production           | SOIC (D)   14  | 50   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74128                            |
| SN74128D.A                      | Active        | Production           | SOIC (D)   14  | 50   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74128                            |
| <a href="#">SN74128N</a>        | Active        | Production           | PDIP (N)   14  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74128N                         |
| <a href="#">SN74128N</a>        | Active        | Production           | PDIP (N)   14  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74128N                         |
| SN74128N.A                      | Active        | Production           | PDIP (N)   14  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74128N                         |
| SN74128N.A                      | Active        | Production           | PDIP (N)   14  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74128N                         |
| <a href="#">SN74128NSR</a>      | Active        | Production           | SOP (NS)   14  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | SN74128                          |
| <a href="#">SN74128NSR</a>      | Active        | Production           | SOP (NS)   14  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | SN74128                          |
| SN74128NSR.A                    | Active        | Production           | SOP (NS)   14  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | SN74128                          |
| SN74128NSR.A                    | Active        | Production           | SOP (NS)   14  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | SN74128                          |
| <a href="#">SNJ54128J</a>       | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9861101QC<br>A<br>SNJ54128J |
| <a href="#">SNJ54128J</a>       | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9861101QC<br>A<br>SNJ54128J |

| Orderable part number     | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6)              |
|---------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|----------------------------------|
| SNJ54128J.A               | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9861101QC<br>A<br>SNJ54128J |
| SNJ54128J.A               | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9861101QC<br>A<br>SNJ54128J |
| <a href="#">SNJ54128W</a> | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9861101QD<br>A<br>SNJ54128W |
| <a href="#">SNJ54128W</a> | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9861101QD<br>A<br>SNJ54128W |
| SNJ54128W.A               | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9861101QD<br>A<br>SNJ54128W |
| SNJ54128W.A               | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 5962-9861101QD<br>A<br>SNJ54128W |

(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.

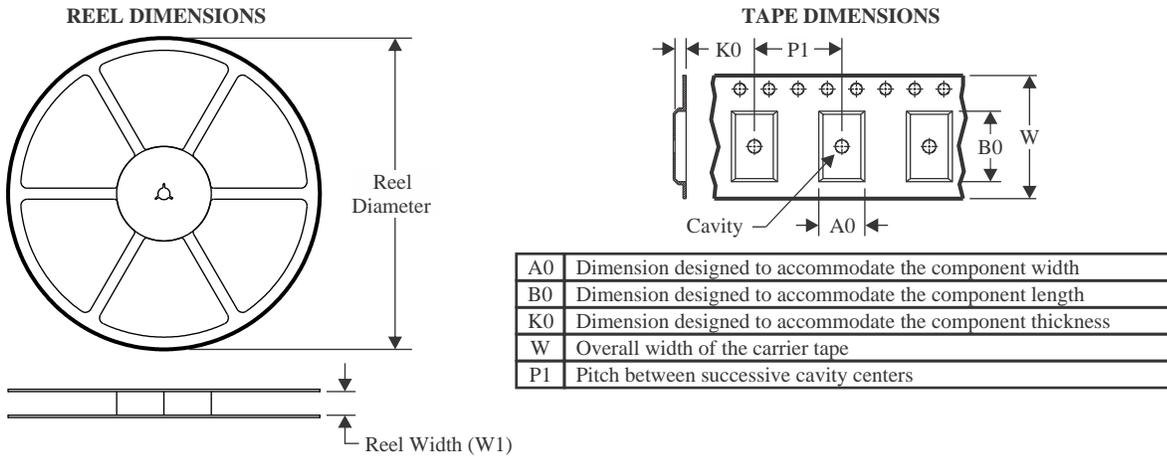
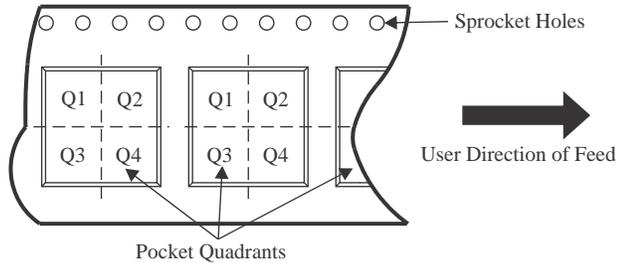
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

**OTHER QUALIFIED VERSIONS OF SN54128, SN74128 :**

- Catalog : [SN74128](#)
- Military : [SN54128](#)

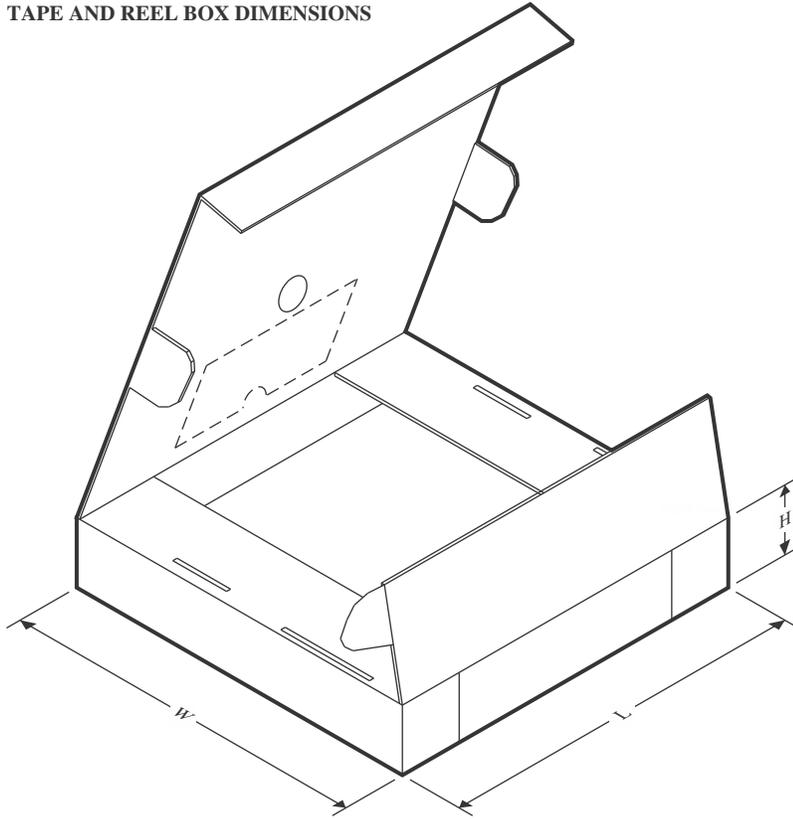
NOTE: Qualified Version Definitions:

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

**TAPE AND REEL INFORMATION**

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


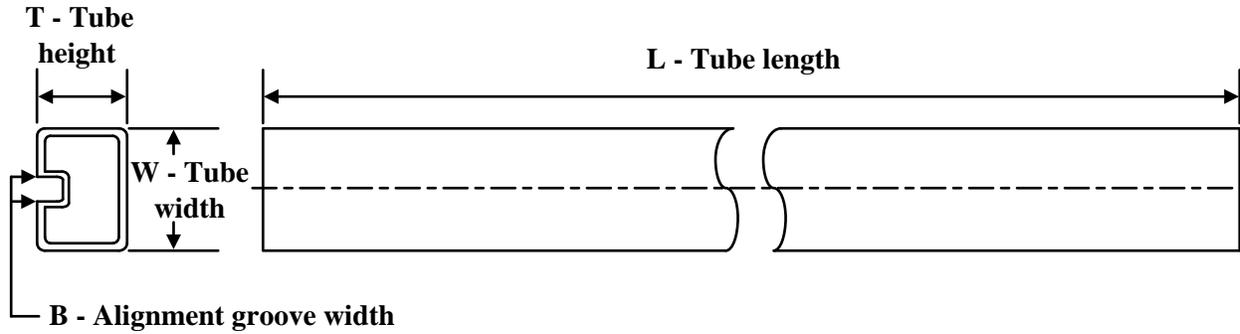
\*All dimensions are nominal

| Device     | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74128NSR | SOP          | NS              | 14   | 2000 | 330.0              | 16.4               | 8.1     | 10.4    | 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) |
|------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74128NSR | SOP          | NS              | 14   | 2000 | 353.0       | 353.0      | 32.0        |

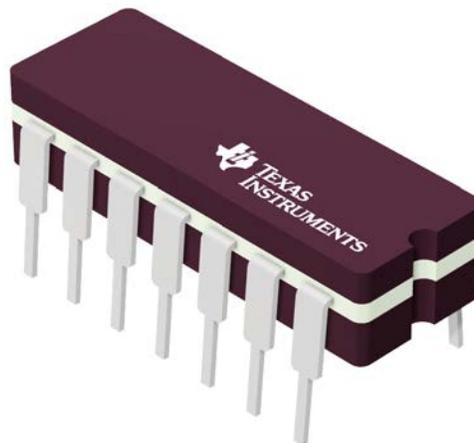
**TUBE**


\*All dimensions are nominal

| Device          | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|-----------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| 5962-9861101QDA | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |
| SN74128D        | D            | SOIC         | 14   | 50  | 506.6  | 8      | 3940   | 4.32   |
| SN74128D.A      | D            | SOIC         | 14   | 50  | 506.6  | 8      | 3940   | 4.32   |
| SN74128N        | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| SN74128N        | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| SN74128N.A      | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| SN74128N.A      | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| SNJ54128W       | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |
| SNJ54128W.A     | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |

J 14

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



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

4040083-5/G

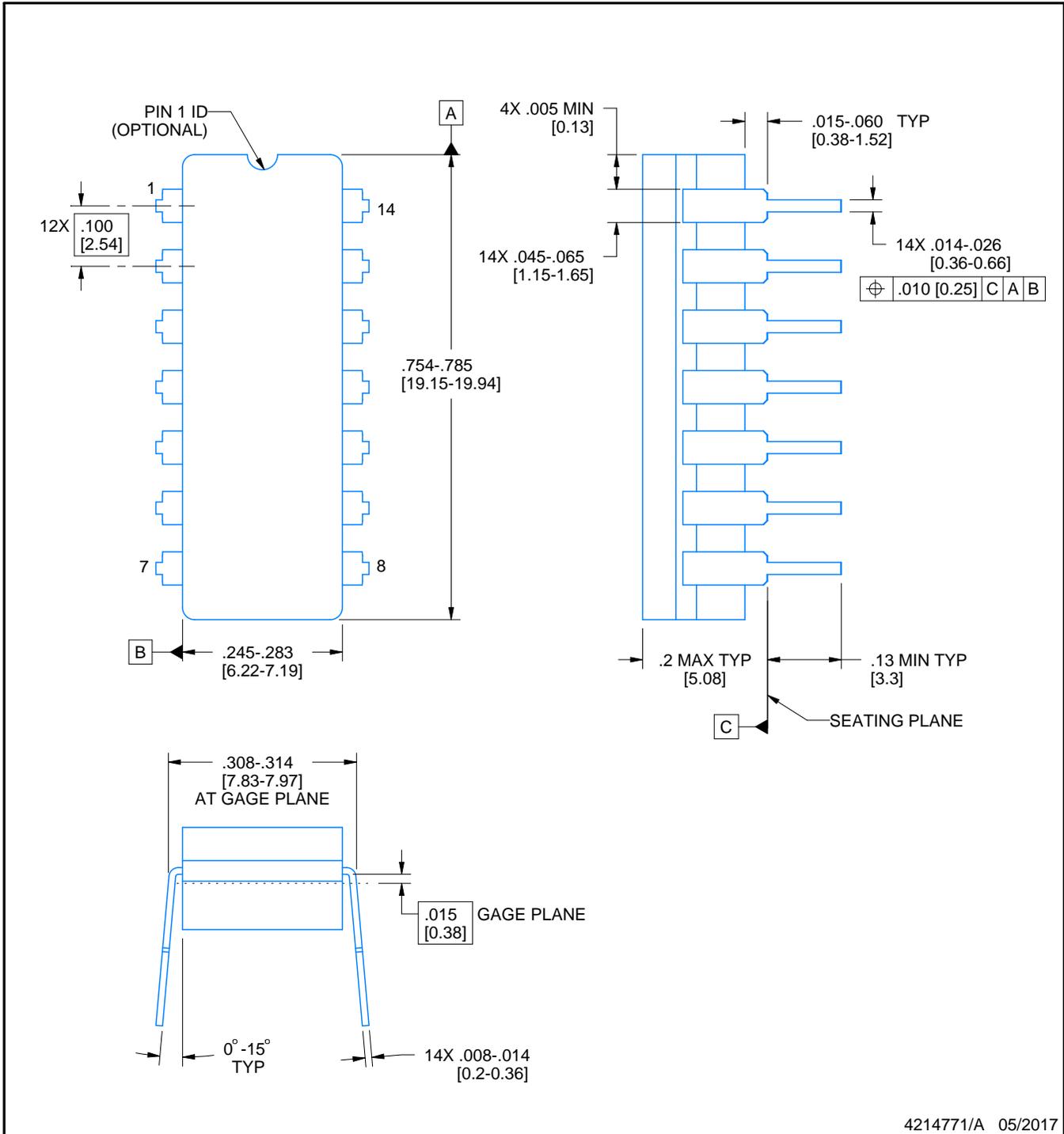
# J0014A



# PACKAGE OUTLINE

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



4214771/A 05/2017

**NOTES:**

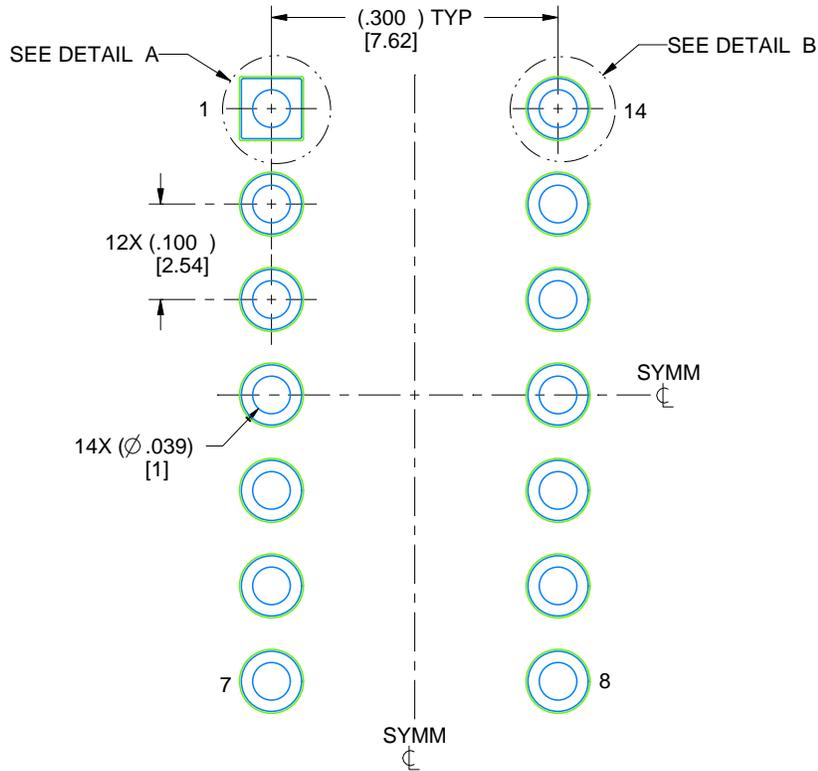
1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermetically sealed with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

# EXAMPLE BOARD LAYOUT

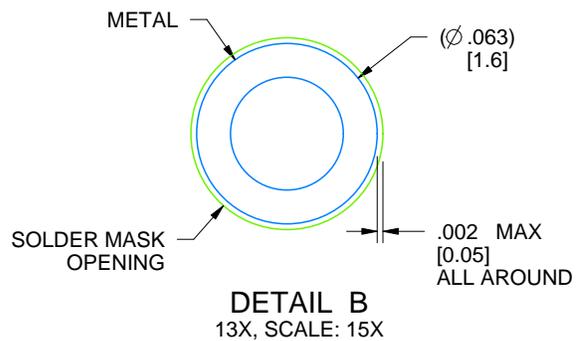
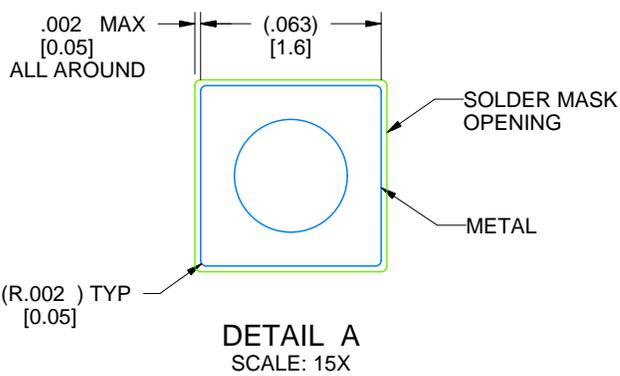
J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



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

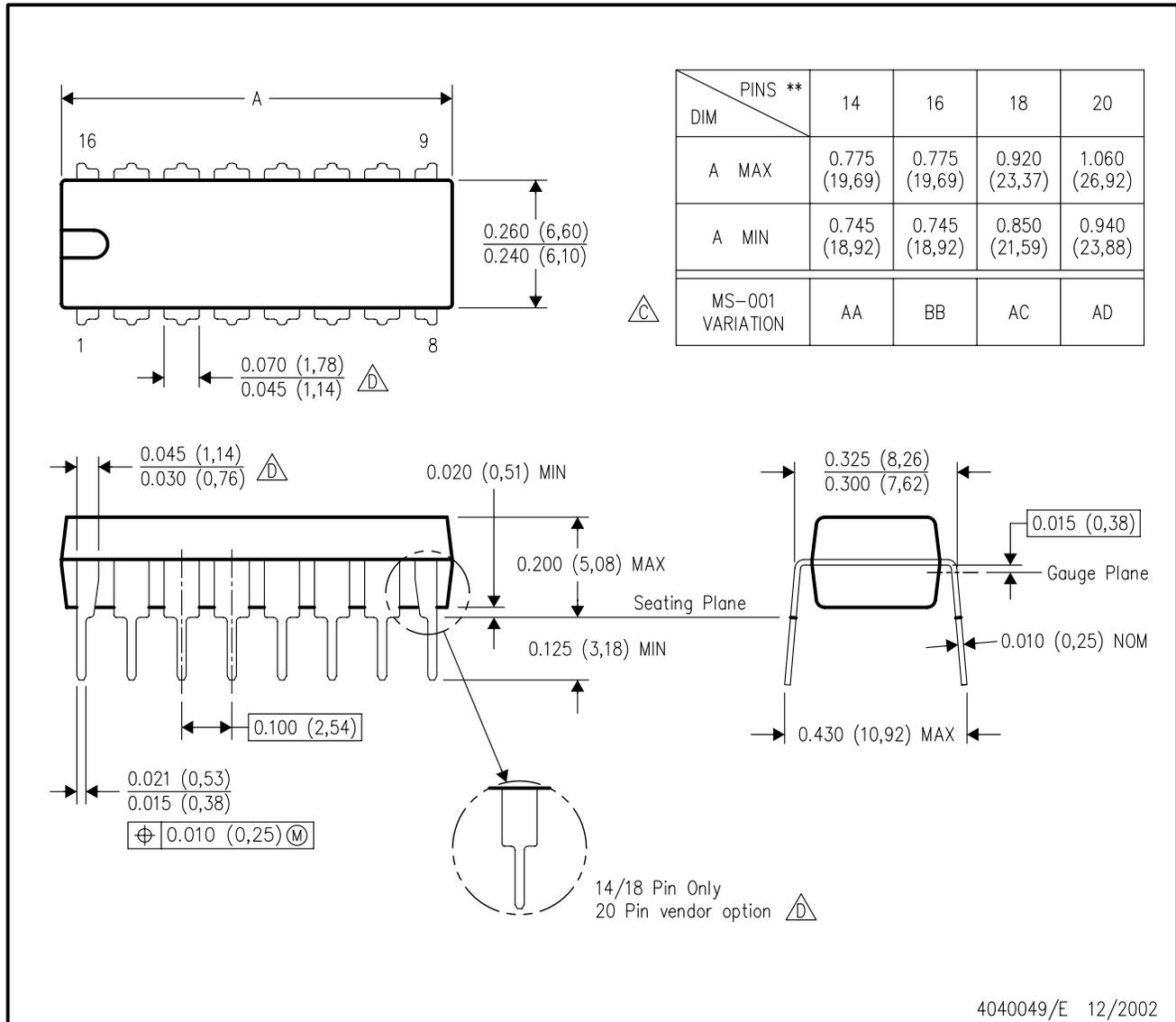


4214771/A 05/2017

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.
  - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - The 20 pin end lead shoulder width is a vendor option, either half or full width.

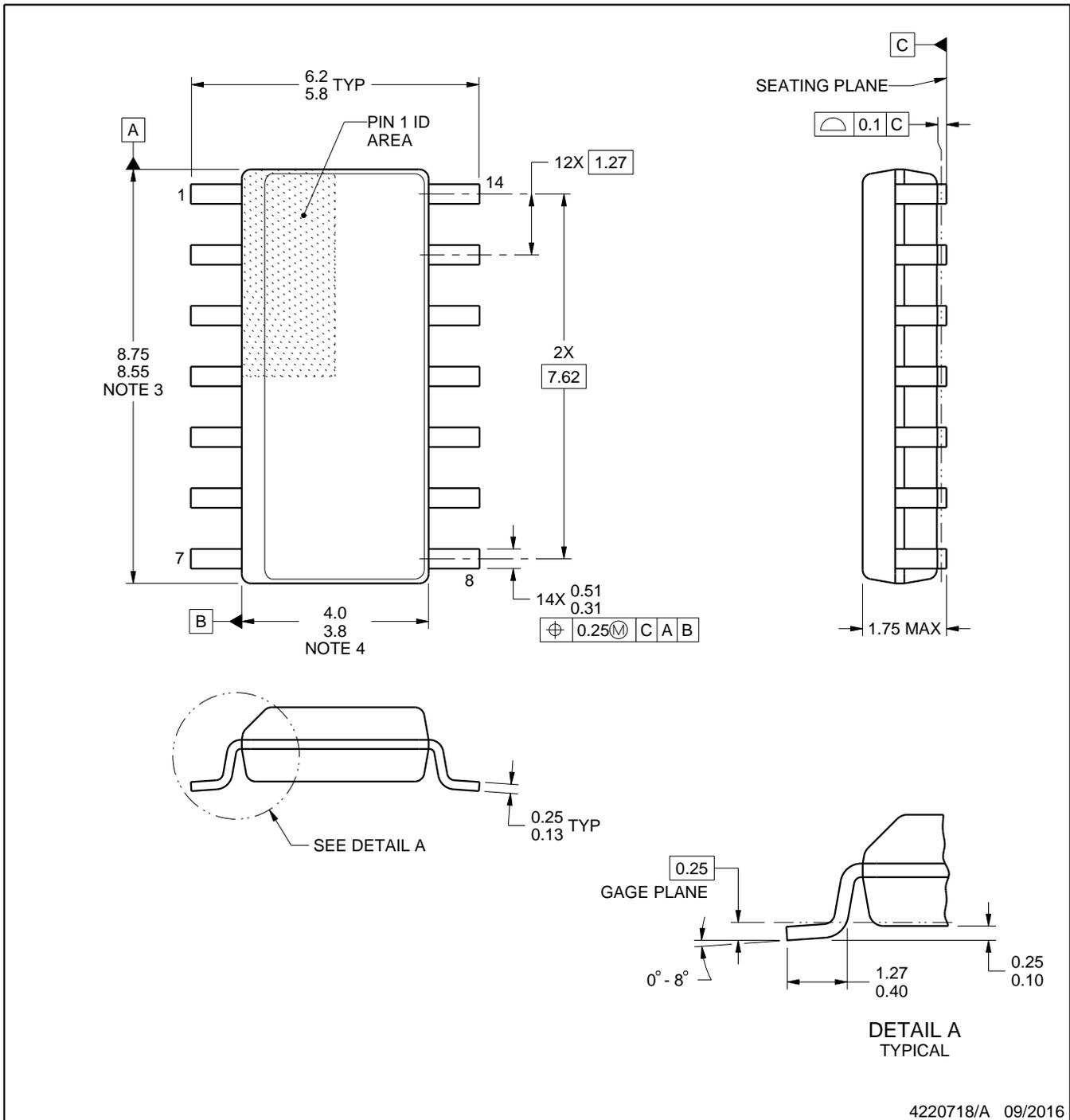


# D0014A

# PACKAGE OUTLINE

## SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



4220718/A 09/2016

### NOTES:

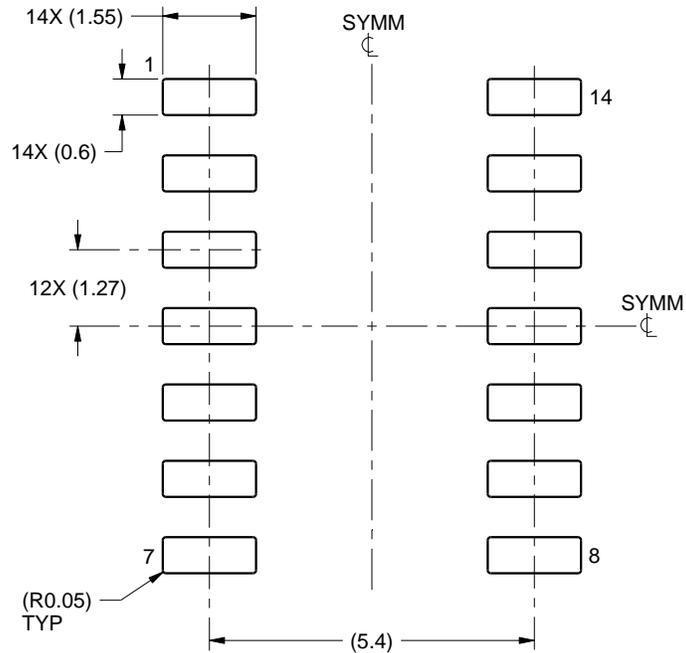
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate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

# EXAMPLE BOARD LAYOUT

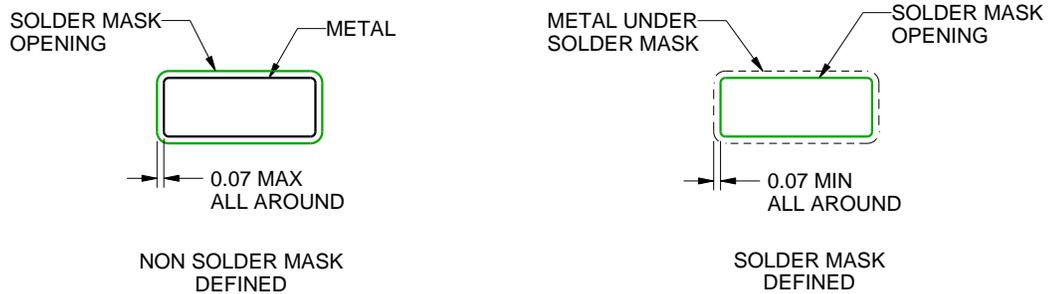
D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE  
SCALE:8X



SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

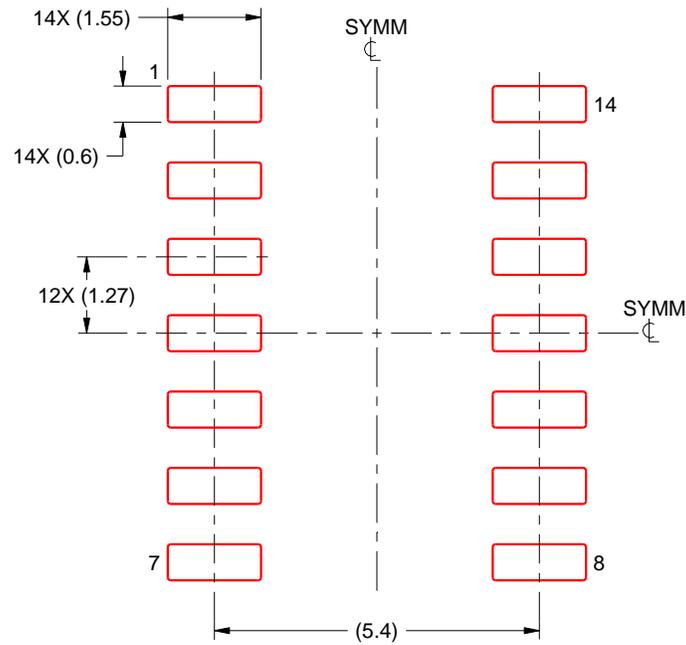
- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



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

4220718/A 09/2016

NOTES: (continued)

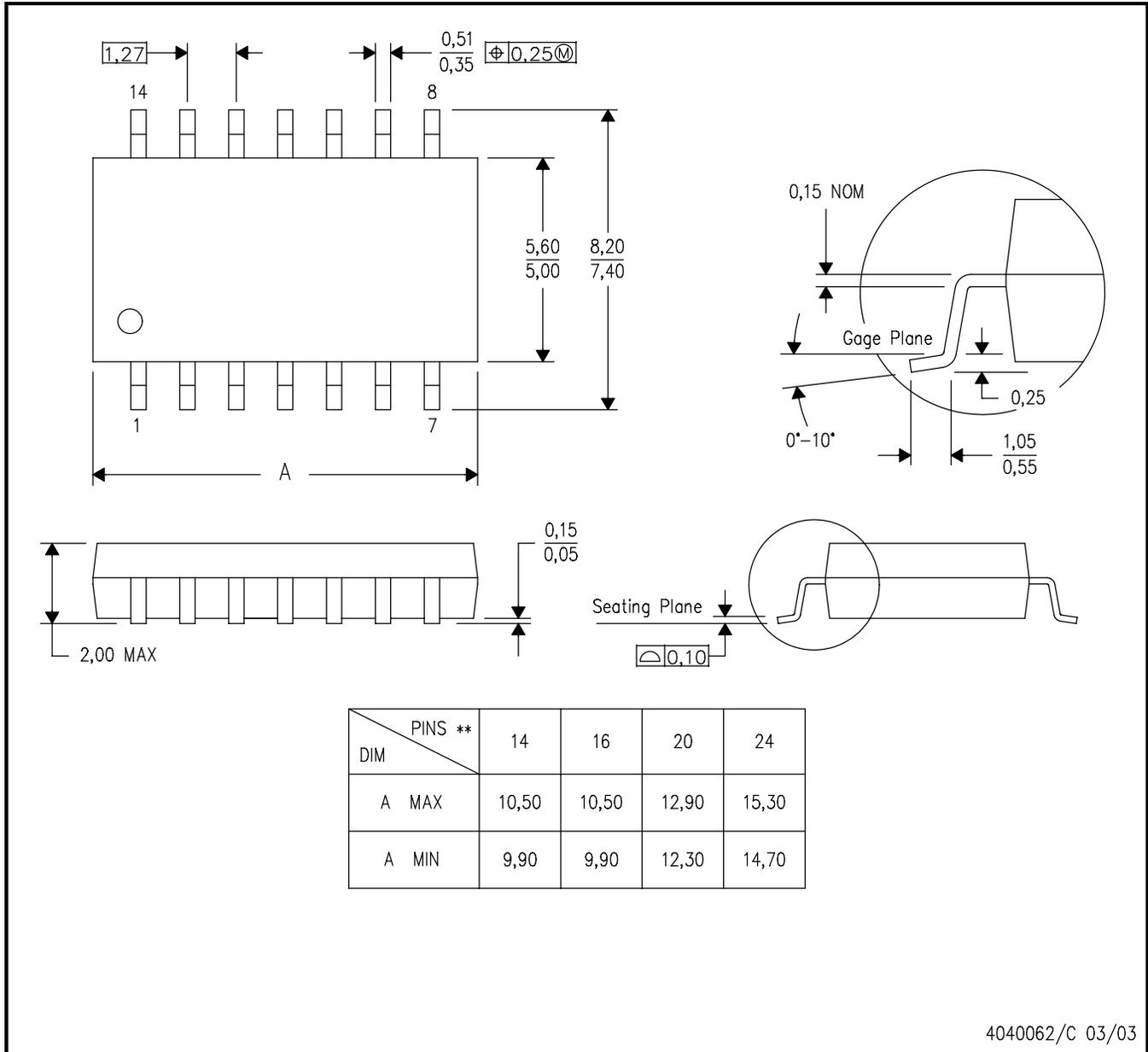
8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

# MECHANICAL DATA

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

PLASTIC SMALL-OUTLINE PACKAGE

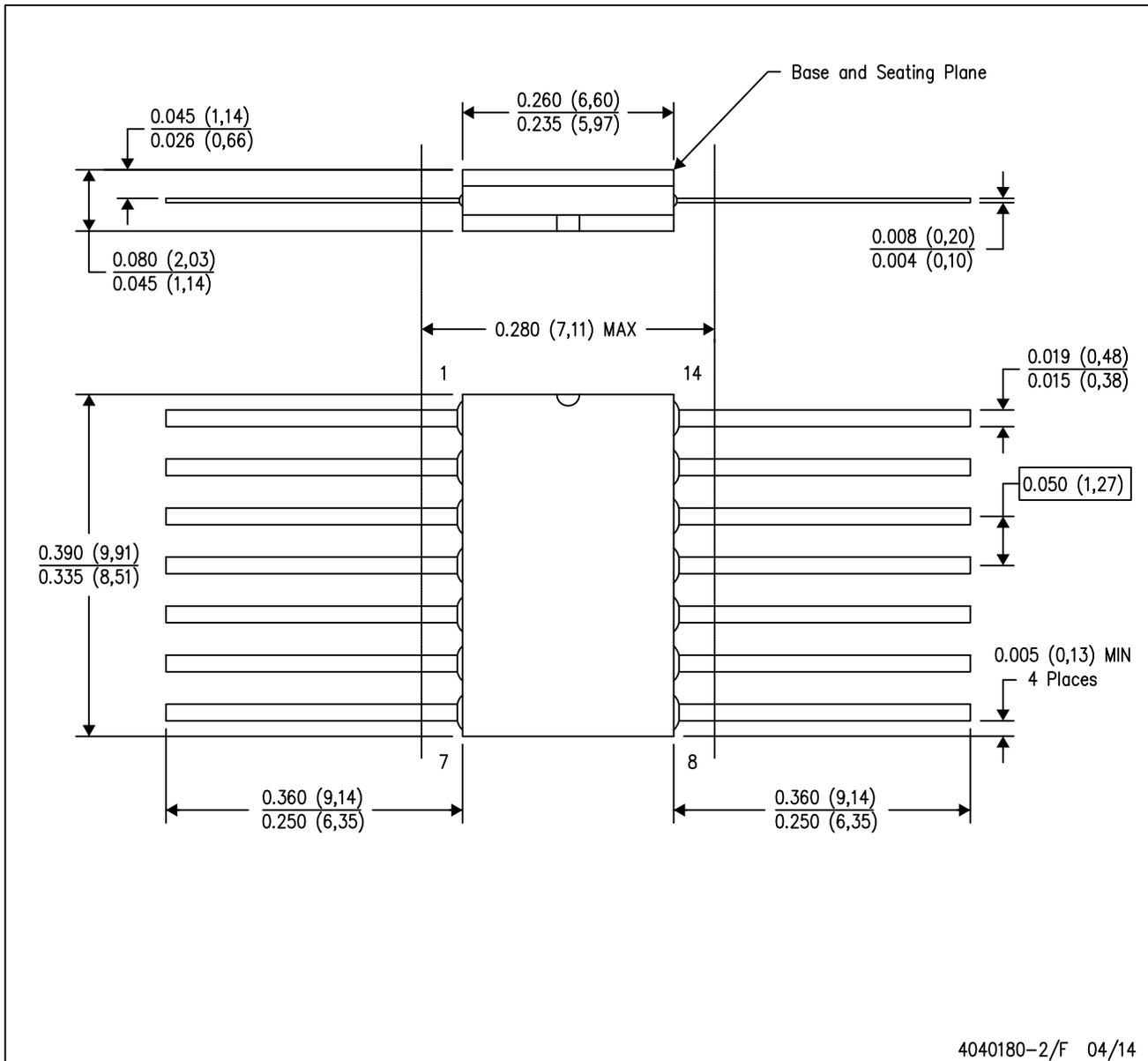
14-PINS SHOWN



- 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



4040180-2/F 04/14

- 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

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