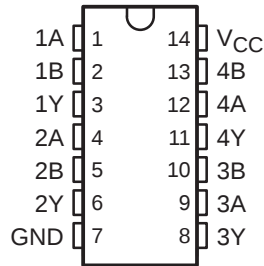


# SN54HC86, SN74HC86 QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES

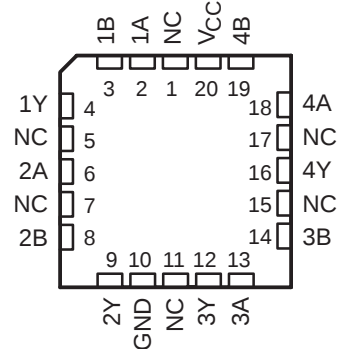
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- Wide Operating Voltage Range of 2 V to 6 V
- Outputs Can Drive Up To 10 LSTTL Loads
- Low Power Consumption, 20-μA Max  $I_{CC}$
- Typical  $t_{pd} = 10$  ns
- $\pm 4$ -mA Output Drive at 5 V
- Low Input Current of 1 μA Max
- True Logic

SN54HC86 . . . J OR W PACKAGE  
SN74HC86 . . . D, N, NS, OR PW PACKAGE  
(TOP VIEW)



SN54HC86 . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

## description/ordering information

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

A common application is as a true/complement element. If one of the inputs is low, the other input is reproduced in true form at the output. If one of the inputs is high, the signal on the other input is reproduced inverted at the output.

## ORDERING INFORMATION

| T <sub>A</sub> | PACKAGE <sup>†</sup> |              | ORDERABLE<br>PART NUMBER | TOP-SIDE<br>MARKING |
|----------------|----------------------|--------------|--------------------------|---------------------|
| –40°C to 85°C  | PDIP – N             | Tube of 25   | SN74HC86N                | SN74HC86N           |
|                | SOIC – D             | Tube of 50   | SN74HC86D                | HC86                |
|                |                      | Reel of 2500 | SN74HC86DR               |                     |
|                |                      | Reel of 250  | SN74HC86DT               |                     |
|                | SOP – NS             | Reel of 2000 | SN74HC86NSR              | HC86                |
|                | TSSOP – PW           | Tube of 90   | SN74HC86PW               | HC86                |
|                |                      | Reel of 2000 | SN74HC86PWR              |                     |
|                |                      | Reel of 250  | SN74HC86PWT              |                     |
| –55°C to 125°C | CDIP – J             | Tube of 25   | SNJ54HC86J               | SNJ54HC86J          |
|                | CFP – W              | Tube of 150  | SNJ54HC86W               | SNJ54HC86W          |
|                | LCCC – FK            | Tube of 55   | SNJ54HC86FK              | SNJ54HC86FK         |

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



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**

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# SN54HC86, SN74HC86 QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES

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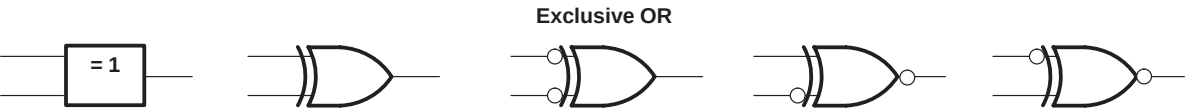
FUNCTION TABLE

(each gate)

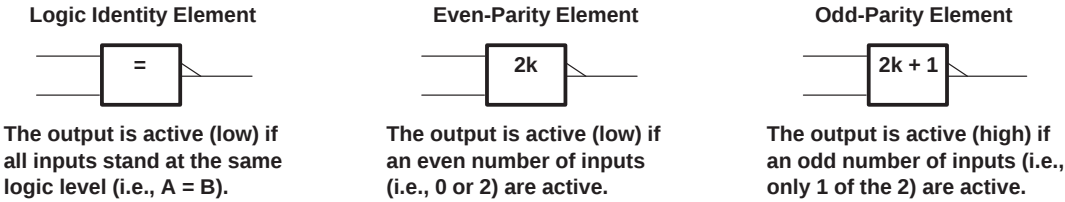
| INPUTS |   | OUTPUT<br>Y |
|--------|---|-------------|
| A      | B |             |
| L      | L | L           |
| L      | H | H           |
| H      | L | H           |
| H      | H | L           |

## exclusive-OR logic

An exclusive-OR gate has many applications, some of which can be represented better by alternative logic symbols.



These are five equivalent exclusive-OR symbols valid for an 'HC86 gate in positive logic; negation may be shown at any two ports.



## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

|                                                                                                              |                |
|--------------------------------------------------------------------------------------------------------------|----------------|
| Supply voltage range, V <sub>CC</sub>                                                                        | −0.5 V to 7 V  |
| Input clamp current, I <sub>IK</sub> (V <sub>I</sub> < 0 or V <sub>I</sub> > V <sub>CC</sub> ) (see Note 1)  | ±20 mA         |
| Output clamp current, I <sub>OK</sub> (V <sub>O</sub> < 0 or V <sub>O</sub> > V <sub>CC</sub> ) (see Note 1) | ±20 mA         |
| Continuous output current, I <sub>O</sub> (V <sub>O</sub> = 0 to V <sub>CC</sub> )                           | ±25 mA         |
| Continuous current through V <sub>CC</sub> or GND                                                            | ±50 mA         |
| Package thermal impedance, θ <sub>JA</sub> (see Note 2):                                                     |                |
| D package                                                                                                    | 86°C/W         |
| N package                                                                                                    | 80°C/W         |
| NS package                                                                                                   | 76°C/W         |
| PW package                                                                                                   | 113°C/W        |
| Storage temperature range, T <sub>stg</sub>                                                                  | −65°C to 150°C |

<sup>†</sup> 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. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.  
2. The package thermal impedance is calculated in accordance with JESD 51-7.

# SN54HC86, SN74HC86 QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES

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## recommended operating conditions (see Note 3)

|                     |                                 |                         | SN54HC86 |     |                 | SN74HC86 |     |                 | UNIT |
|---------------------|---------------------------------|-------------------------|----------|-----|-----------------|----------|-----|-----------------|------|
|                     |                                 |                         | MIN      | NOM | MAX             | MIN      | NOM | MAX             |      |
| V <sub>CC</sub>     | Supply voltage                  |                         | 2        | 5   | 6               | 2        | 5   | 6               | V    |
| V <sub>IH</sub>     | High-level input voltage        | V <sub>CC</sub> = 2 V   | 1.5      |     |                 | 1.5      |     |                 | V    |
|                     |                                 | V <sub>CC</sub> = 4.5 V | 3.15     |     |                 | 3.15     |     |                 |      |
|                     |                                 | V <sub>CC</sub> = 6 V   | 4.2      |     |                 | 4.2      |     |                 |      |
| V <sub>IL</sub>     | Low-level input voltage         | V <sub>CC</sub> = 2 V   |          |     | 0.5             |          |     | 0.5             | V    |
|                     |                                 | V <sub>CC</sub> = 4.5 V |          |     | 1.35            |          |     | 1.35            |      |
|                     |                                 | V <sub>CC</sub> = 6 V   |          |     | 1.8             |          |     | 1.8             |      |
| V <sub>I</sub>      | Input voltage                   |                         | 0        |     | V <sub>CC</sub> | 0        |     | V <sub>CC</sub> | V    |
| V <sub>O</sub>      | Output voltage                  |                         | 0        |     | V <sub>CC</sub> | 0        |     | V <sub>CC</sub> | V    |
| $\Delta t/\Delta v$ | Input transition rise/fall time | V <sub>CC</sub> = 2 V   |          |     | 1000            |          |     | 1000            | ns   |
|                     |                                 | V <sub>CC</sub> = 4.5 V |          |     | 500             |          |     | 500             |      |
|                     |                                 | V <sub>CC</sub> = 6 V   |          |     | 400             |          |     | 400             |      |
| T <sub>A</sub>      | Operating free-air temperature  |                         | –55      |     | 125             | –40      |     | 85              | °C   |

NOTE 3: All unused inputs of the device must be held at V<sub>CC</sub> 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                                           |                           | V <sub>CC</sub> | T <sub>A</sub> = 25°C |       |      | SN54HC86 |       | SN74HC86 |       | UNIT |
|-----------------|-----------------------------------------------------------|---------------------------|-----------------|-----------------------|-------|------|----------|-------|----------|-------|------|
|                 |                                                           |                           |                 | MIN                   | TYP   | MAX  | MIN      | MAX   | MIN      | MAX   |      |
| V <sub>OH</sub> | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>       | I <sub>OH</sub> = –20 µA  | 2 V             | 1.9                   | 1.998 |      | 1.9      |       | 1.9      |       | V    |
|                 |                                                           |                           | 4.5 V           | 4.4                   | 4.499 |      | 4.4      |       | 4.4      |       |      |
|                 |                                                           |                           | 6 V             | 5.9                   | 5.999 |      | 5.9      |       | 5.9      |       |      |
|                 |                                                           | I <sub>OH</sub> = –4 mA   | 4.5 V           | 3.98                  | 4.3   |      | 3.7      |       | 3.84     |       |      |
|                 |                                                           | I <sub>OH</sub> = –5.2 mA | 6 V             | 5.48                  | 5.8   |      | 5.2      |       | 5.34     |       |      |
| V <sub>OL</sub> | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>       | I <sub>OL</sub> = 20 µA   | 2 V             |                       | 0.002 | 0.1  |          | 0.1   |          | 0.1   | V    |
|                 |                                                           |                           | 4.5 V           |                       | 0.001 | 0.1  |          | 0.1   |          | 0.1   |      |
|                 |                                                           |                           | 6 V             |                       | 0.001 | 0.1  |          | 0.1   |          | 0.1   |      |
|                 |                                                           | I <sub>OL</sub> = 4 mA    | 4.5 V           |                       | 0.17  | 0.26 |          | 0.4   |          | 0.33  |      |
|                 |                                                           | I <sub>OL</sub> = 5.2 mA  | 6 V             |                       | 0.15  | 0.26 |          | 0.4   |          | 0.33  |      |
| I <sub>I</sub>  | V <sub>I</sub> = V <sub>CC</sub> or 0                     |                           | 6 V             |                       | ±0.1  | ±100 |          | ±1000 |          | ±1000 | nA   |
| I <sub>CC</sub> | V <sub>I</sub> = V <sub>CC</sub> or 0, I <sub>O</sub> = 0 |                           | 6 V             |                       |       | 2    |          | 40    |          | 20    | µA   |
| C <sub>i</sub>  |                                                           |                           | 2 V to 6 V      |                       | 3     | 10   |          | 10    |          | 10    | pF   |



# SN54HC86, SN74HC86 QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES

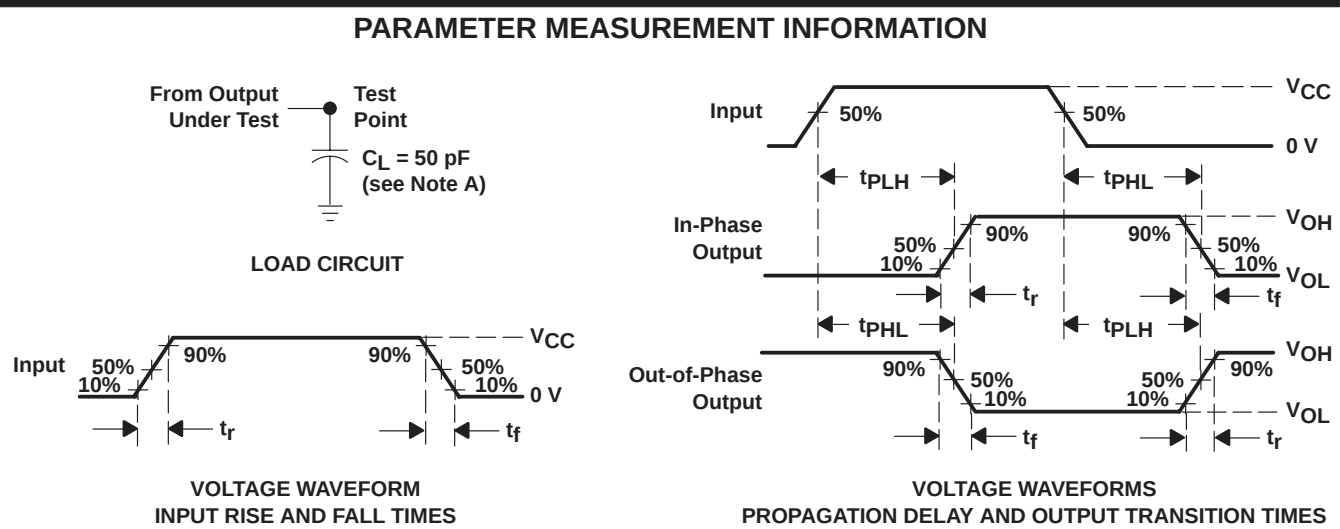
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switching characteristics over recommended operating free-air temperature range,  $C_L = 50\text{ pF}$  (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC}$ | $T_A = 25^{\circ}\text{C}$ |     |     | SN54HC86 |     | SN74HC86 |     | UNIT |
|-----------|--------------|-------------|----------|----------------------------|-----|-----|----------|-----|----------|-----|------|
|           |              |             |          | MIN                        | TYP | MAX | MIN      | MAX | MIN      | MAX |      |
| $t_{pd}$  | A or B       | Y           | 2 V      |                            | 40  | 100 |          | 150 |          | 125 | ns   |
|           |              |             | 4.5 V    |                            | 12  | 20  |          | 30  |          | 25  |      |
|           |              |             | 6 V      |                            | 10  | 17  |          | 25  |          | 21  |      |
| $t_t$     |              | Y           | 2 V      |                            | 28  | 75  |          | 110 |          | 95  | ns   |
|           |              |             | 4.5 V    |                            | 8   | 15  |          | 22  |          | 19  |      |
|           |              |             | 6 V      |                            | 6   | 13  |          | 19  |          | 16  |      |

operating characteristics,  $T_A = 25^{\circ}\text{C}$

| PARAMETER |                                        | TEST CONDITIONS | TYP | UNIT |
|-----------|----------------------------------------|-----------------|-----|------|
| $C_{pd}$  | Power dissipation capacitance per gate | No load         | 35  | pF   |



- NOTES:
- A.  $C_L$  includes probe and test-fixture capacitance.
  - B. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1\text{ MHz}$ ,  $Z_O = 50\text{ }\Omega$ ,  $t_r = 6\text{ ns}$ ,  $t_f = 6\text{ ns}$ .
  - C. The outputs are measured one at a time with one input transition per measurement.
  - D.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .

Figure 1. Load Circuit and Voltage Waveforms

**PACKAGING INFORMATION**

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5)      | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|-------------------------|----------------------|--------------|------------------------------|-------------------------|
| 84046012A        | ACTIVE        | LCCC         | FK                 | 20   | 1              | TBD                        | POST-PLATE              | N / A for Pkg Type   | -55 to 125   | 84046012A<br>SNJ54HC<br>86FK | <a href="#">Samples</a> |
| 8404601CA        | ACTIVE        | CDIP         | J                  | 14   | 1              | TBD                        | Call TI                 | N / A for Pkg Type   | -55 to 125   | 8404601CA<br>SNJ54HC86J      | <a href="#">Samples</a> |
| 8404601DA        | ACTIVE        | CFP          | W                  | 14   | 1              | TBD                        | Call TI                 | N / A for Pkg Type   | -55 to 125   | 8404601DA<br>SNJ54HC86W      | <a href="#">Samples</a> |
| JM38510/65202BCA | ACTIVE        | CDIP         | J                  | 14   | 1              | TBD                        | Call TI                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>65202BCA         | <a href="#">Samples</a> |
| M38510/65202BCA  | ACTIVE        | CDIP         | J                  | 14   | 1              | TBD                        | Call TI                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>65202BCA         | <a href="#">Samples</a> |
| SN54HC86J        | ACTIVE        | CDIP         | J                  | 14   | 1              | TBD                        | Call TI                 | N / A for Pkg Type   | -55 to 125   | SN54HC86J                    | <a href="#">Samples</a> |
| SN74HC86D        | ACTIVE        | SOIC         | D                  | 14   | 50             | Green (RoHS<br>& no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | -40 to 85    | HC86                         | <a href="#">Samples</a> |
| SN74HC86DE4      | ACTIVE        | SOIC         | D                  | 14   | 50             | Green (RoHS<br>& no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | -40 to 85    | HC86                         | <a href="#">Samples</a> |
| SN74HC86DR       | ACTIVE        | SOIC         | D                  | 14   | 2500           | Green (RoHS<br>& no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | -40 to 85    | HC86                         | <a href="#">Samples</a> |
| SN74HC86DT       | ACTIVE        | SOIC         | D                  | 14   | 250            | Green (RoHS<br>& no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | -40 to 85    | HC86                         | <a href="#">Samples</a> |
| SN74HC86N        | ACTIVE        | PDIP         | N                  | 14   | 25             | Green (RoHS<br>& no Sb/Br) | NIPDAU                  | N / A for Pkg Type   | -40 to 85    | SN74HC86N                    | <a href="#">Samples</a> |
| SN74HC86NE4      | ACTIVE        | PDIP         | N                  | 14   | 25             | Green (RoHS<br>& no Sb/Br) | NIPDAU                  | N / A for Pkg Type   | -40 to 85    | SN74HC86N                    | <a href="#">Samples</a> |
| SN74HC86NSR      | ACTIVE        | SO           | NS                 | 14   | 2000           | Green (RoHS<br>& no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | -40 to 85    | HC86                         | <a href="#">Samples</a> |
| SN74HC86NSRE4    | ACTIVE        | SO           | NS                 | 14   | 2000           | Green (RoHS<br>& no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | -40 to 85    | HC86                         | <a href="#">Samples</a> |
| SN74HC86NSRG4    | ACTIVE        | SO           | NS                 | 14   | 2000           | Green (RoHS<br>& no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | -40 to 85    | HC86                         | <a href="#">Samples</a> |
| SN74HC86PW       | ACTIVE        | TSSOP        | PW                 | 14   | 90             | Green (RoHS<br>& no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | -40 to 85    | HC86                         | <a href="#">Samples</a> |
| SN74HC86PWR      | ACTIVE        | TSSOP        | PW                 | 14   | 2000           | Green (RoHS<br>& no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | -40 to 85    | HC86                         | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2) | Lead/Ball Finish<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5)      | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|-----------------|-------------------------|----------------------|--------------|------------------------------|-------------------------|
| SNJ54HC86FK      | ACTIVE        | LCCC         | FK                 | 20   | 1              | TBD             | POST-PLATE              | N / A for Pkg Type   | -55 to 125   | 84046012A<br>SNJ54HC<br>86FK | <a href="#">Samples</a> |
| SNJ54HC86J       | ACTIVE        | CDIP         | J                  | 14   | 1              | TBD             | Call TI                 | N / A for Pkg Type   | -55 to 125   | 8404601CA<br>SNJ54HC86J      | <a href="#">Samples</a> |
| SNJ54HC86W       | ACTIVE        | CFP          | W                  | 14   | 1              | TBD             | Call TI                 | N / A for Pkg Type   | -55 to 125   | 8404601DA<br>SNJ54HC86W      | <a href="#">Samples</a> |

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

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

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

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

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

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

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

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

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

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

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

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

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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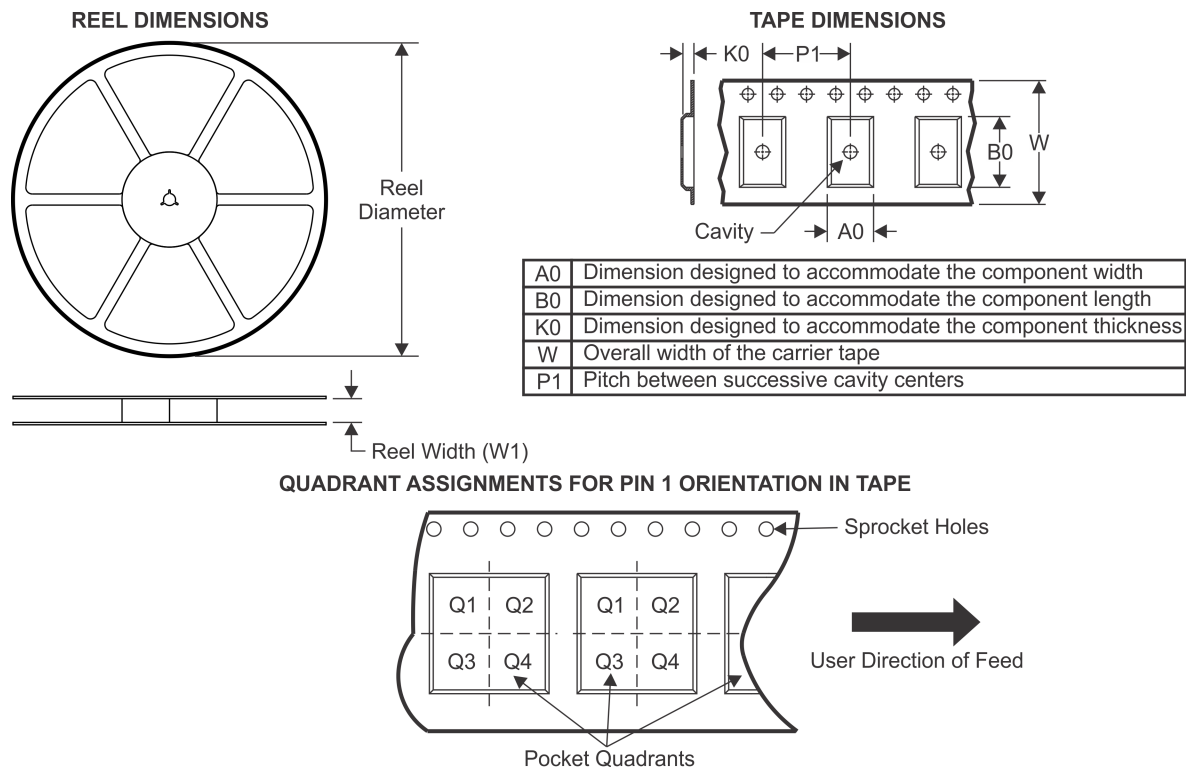
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**OTHER QUALIFIED VERSIONS OF SN54HC86, SN74HC86 :**

- Catalog: [SN74HC86](#)
- Automotive: [SN74HC86-Q1](#), [SN74HC86-Q1](#)
- Military: [SN54HC86](#)

## NOTE: Qualified Version Definitions:

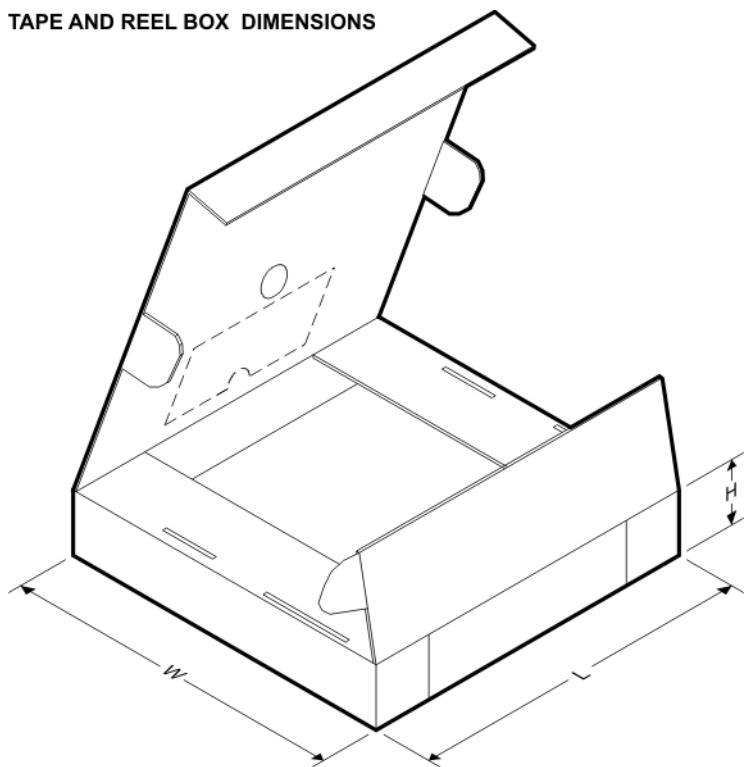
- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Military - QML certified for Military and Defense Applications

**TAPE AND REEL INFORMATION**


\*All dimensions are nominal

| Device      | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|-------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74HC86DR  | SOIC         | D               | 14   | 2500 | 330.0              | 16.4               | 6.5     | 9.0     | 2.1     | 8.0     | 16.0   | Q1            |
| SN74HC86DR  | SOIC         | D               | 14   | 2500 | 330.0              | 16.4               | 6.5     | 9.0     | 2.1     | 8.0     | 16.0   | Q1            |
| SN74HC86DT  | SOIC         | D               | 14   | 250  | 330.0              | 16.4               | 6.5     | 9.0     | 2.1     | 8.0     | 16.0   | Q1            |
| SN74HC86PWR | TSSOP        | PW              | 14   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS

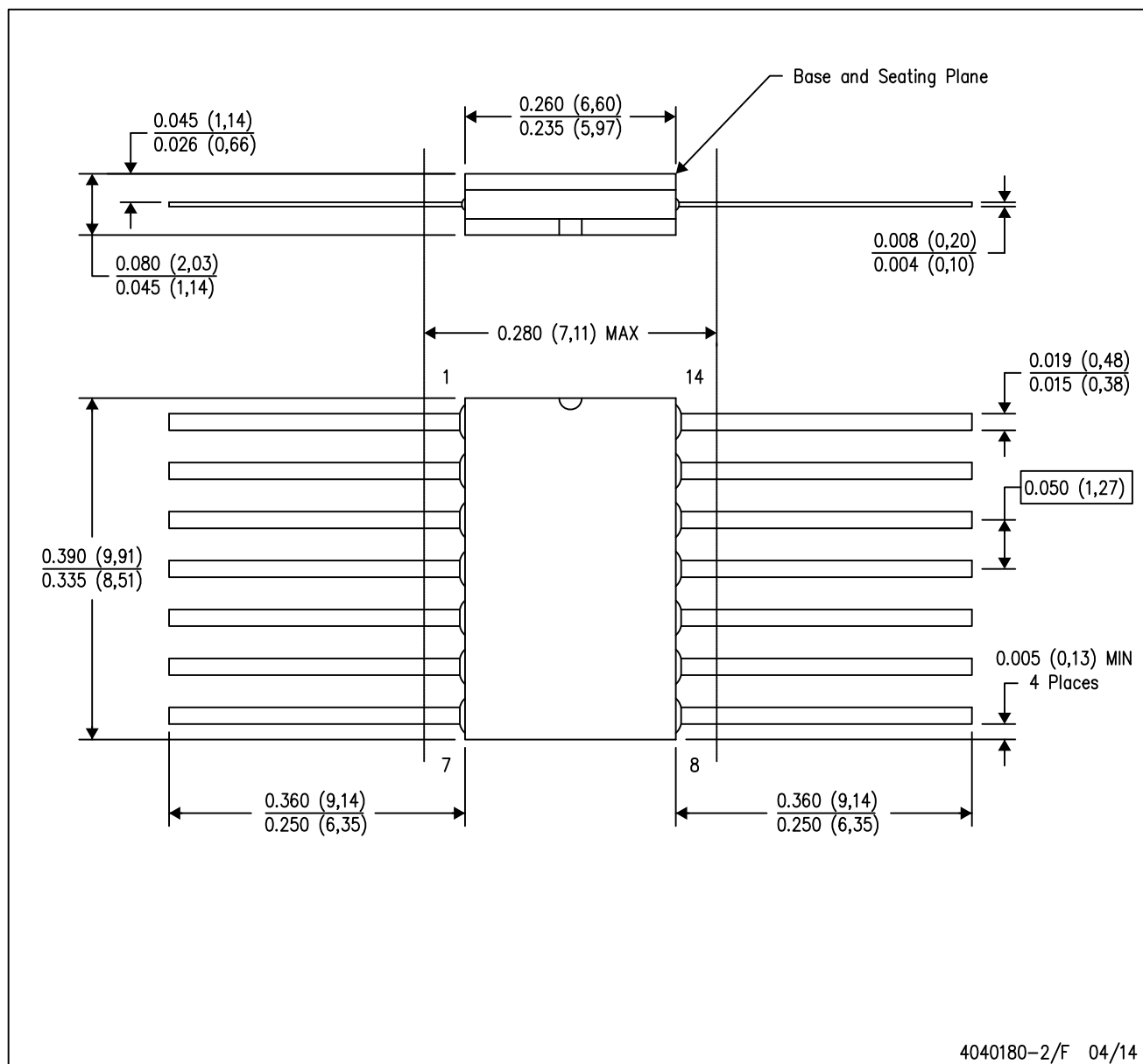


\*All dimensions are nominal

| Device      | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|-------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74HC86DR  | SOIC         | D               | 14   | 2500 | 333.2       | 345.9      | 28.6        |
| SN74HC86DR  | SOIC         | D               | 14   | 2500 | 367.0       | 367.0      | 38.0        |
| SN74HC86DT  | SOIC         | D               | 14   | 250  | 210.0       | 185.0      | 35.0        |
| SN74HC86PWR | TSSOP        | PW              | 14   | 2000 | 367.0       | 367.0      | 35.0        |

W (R-GDFP-F14)

CERAMIC DUAL FLATPACK

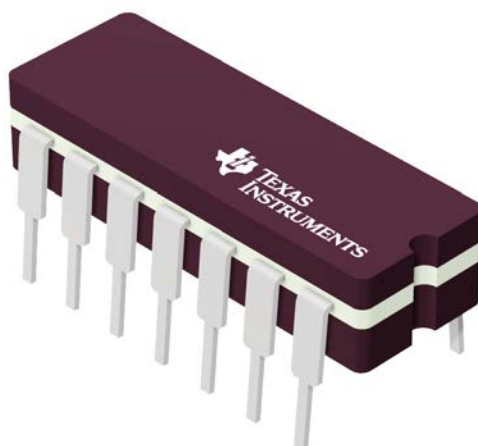


**J 14**

## GENERIC PACKAGE VIEW

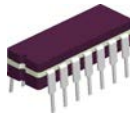
**CDIP - 5.08 mm max height**

CERAMIC DUAL IN LINE PACKAGE

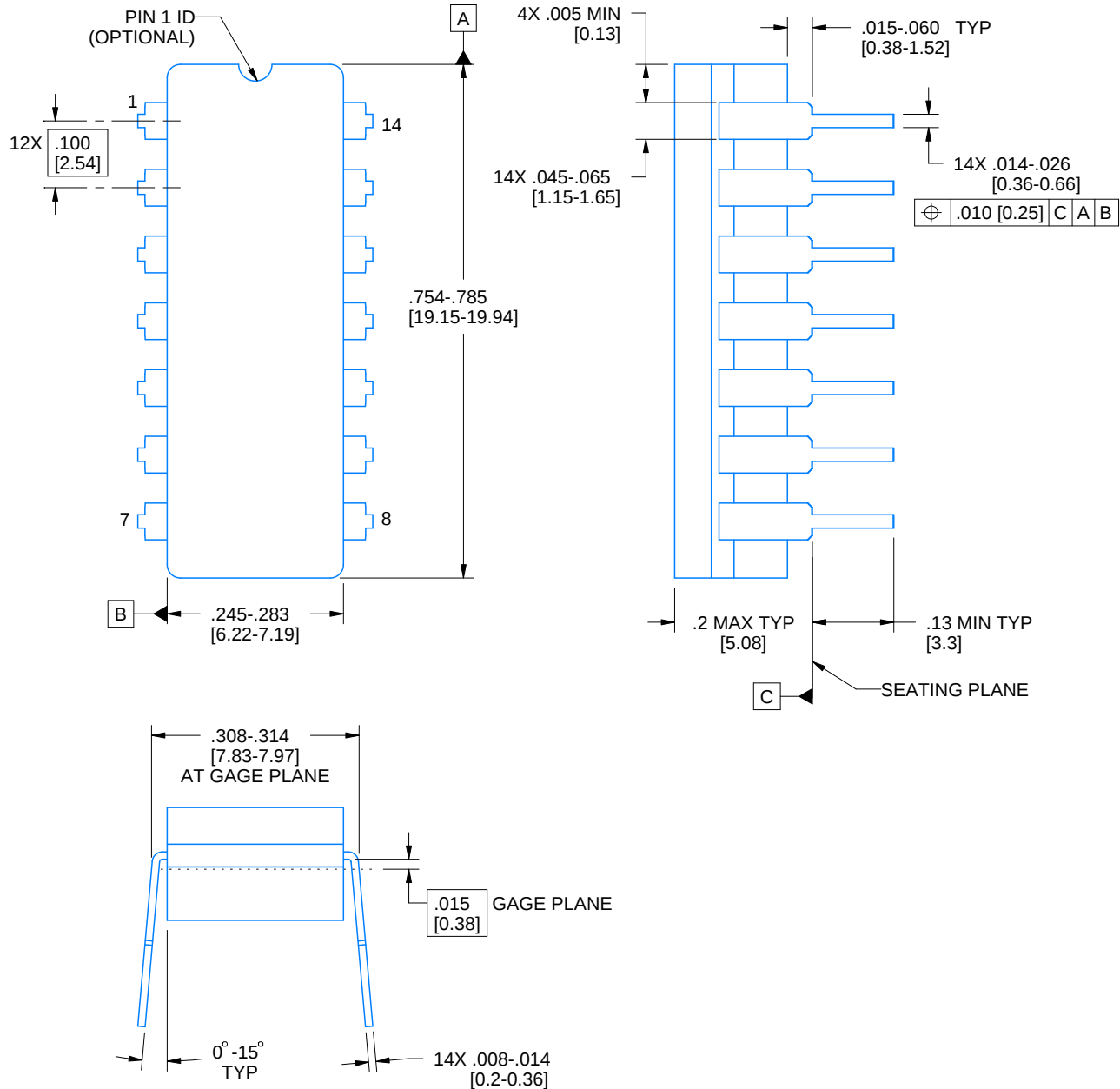


Images above are just a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.

4040083-5/G

**J0014A****PACKAGE OUTLINE****CDIP - 5.08 mm max height**

CERAMIC DUAL IN LINE PACKAGE



4214771/A 05/2017

**NOTES:**

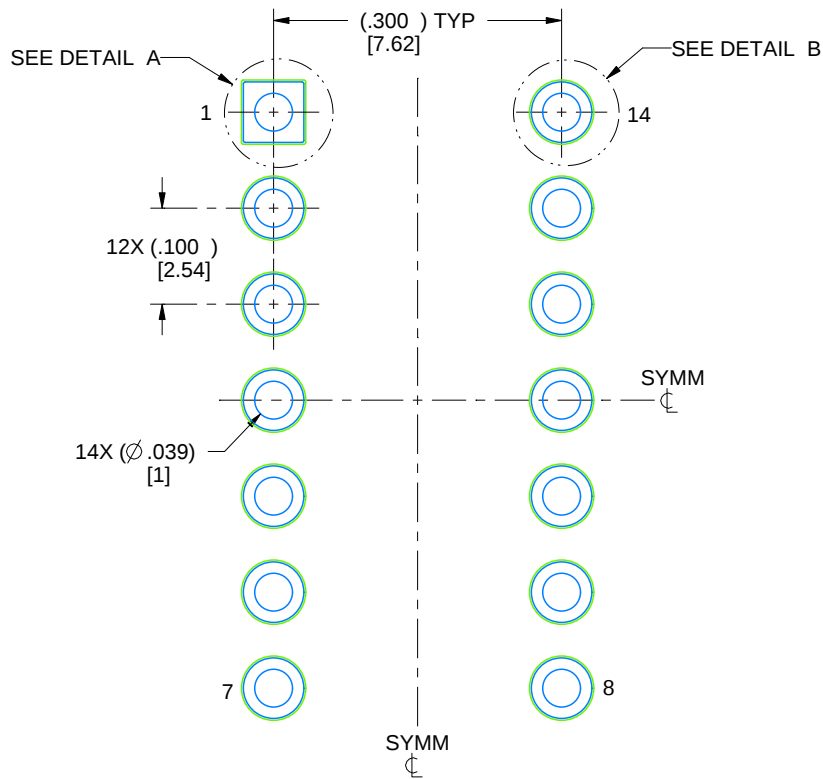
1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermetically sealed with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

# EXAMPLE BOARD LAYOUT

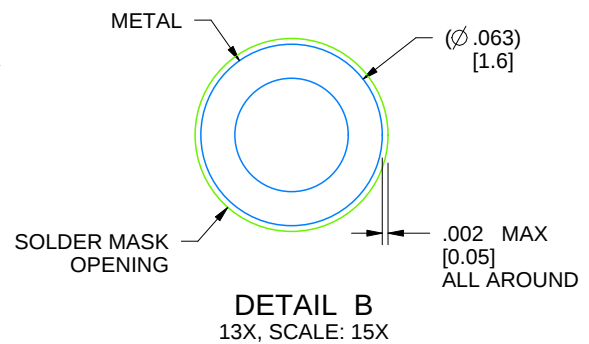
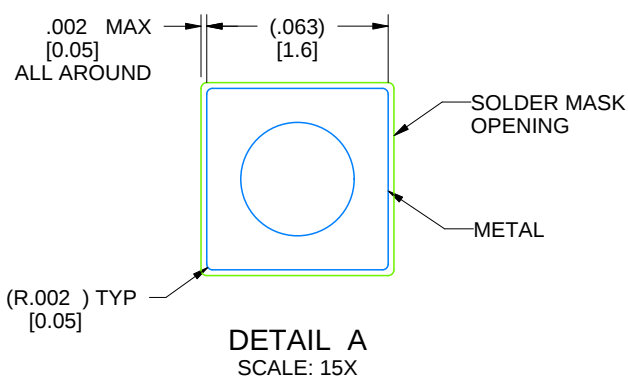
J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



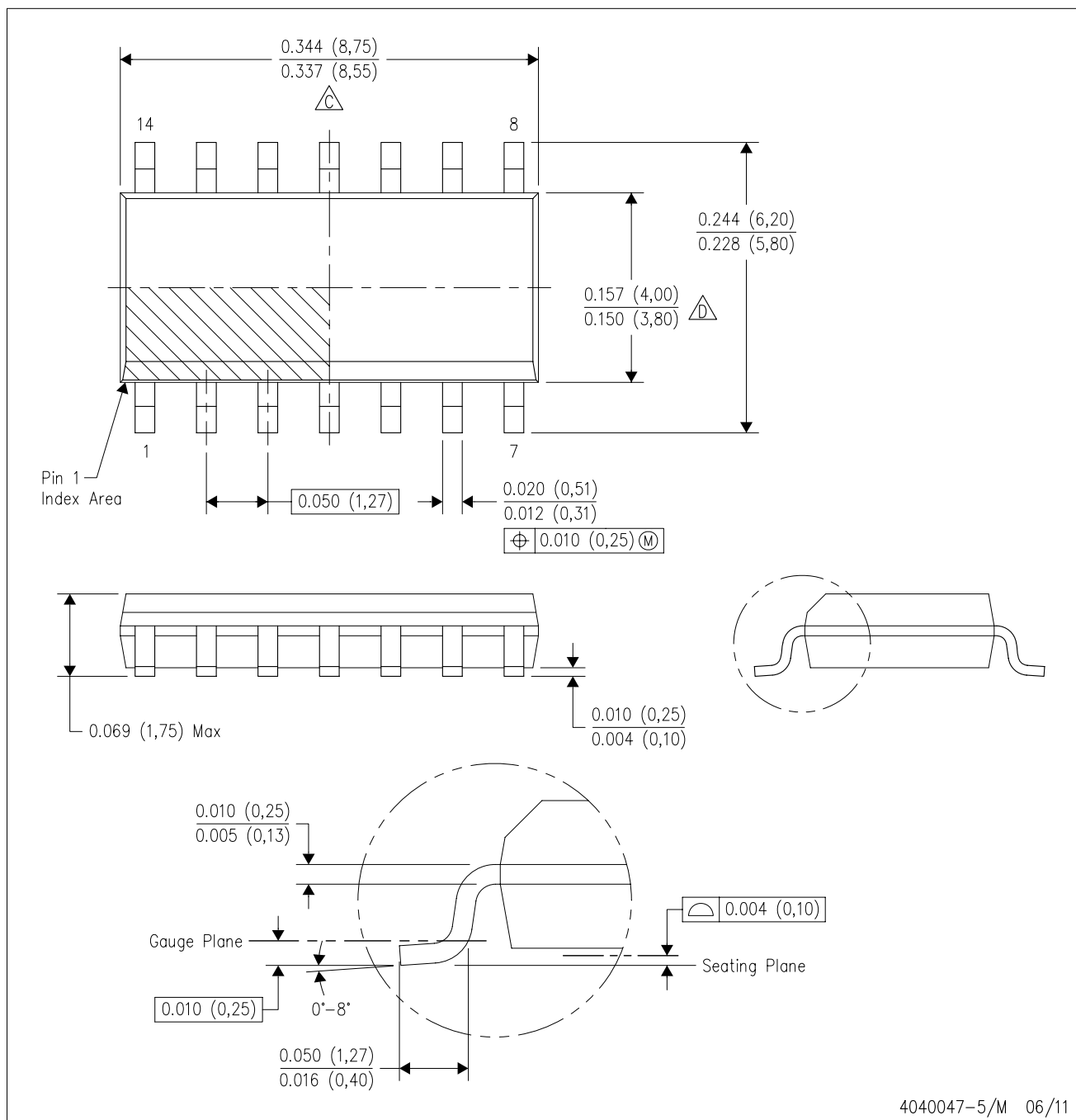
LAND PATTERN EXAMPLE  
NON-SOLDER MASK DEFINED  
SCALE: 5X



4214771/A 05/2017

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE

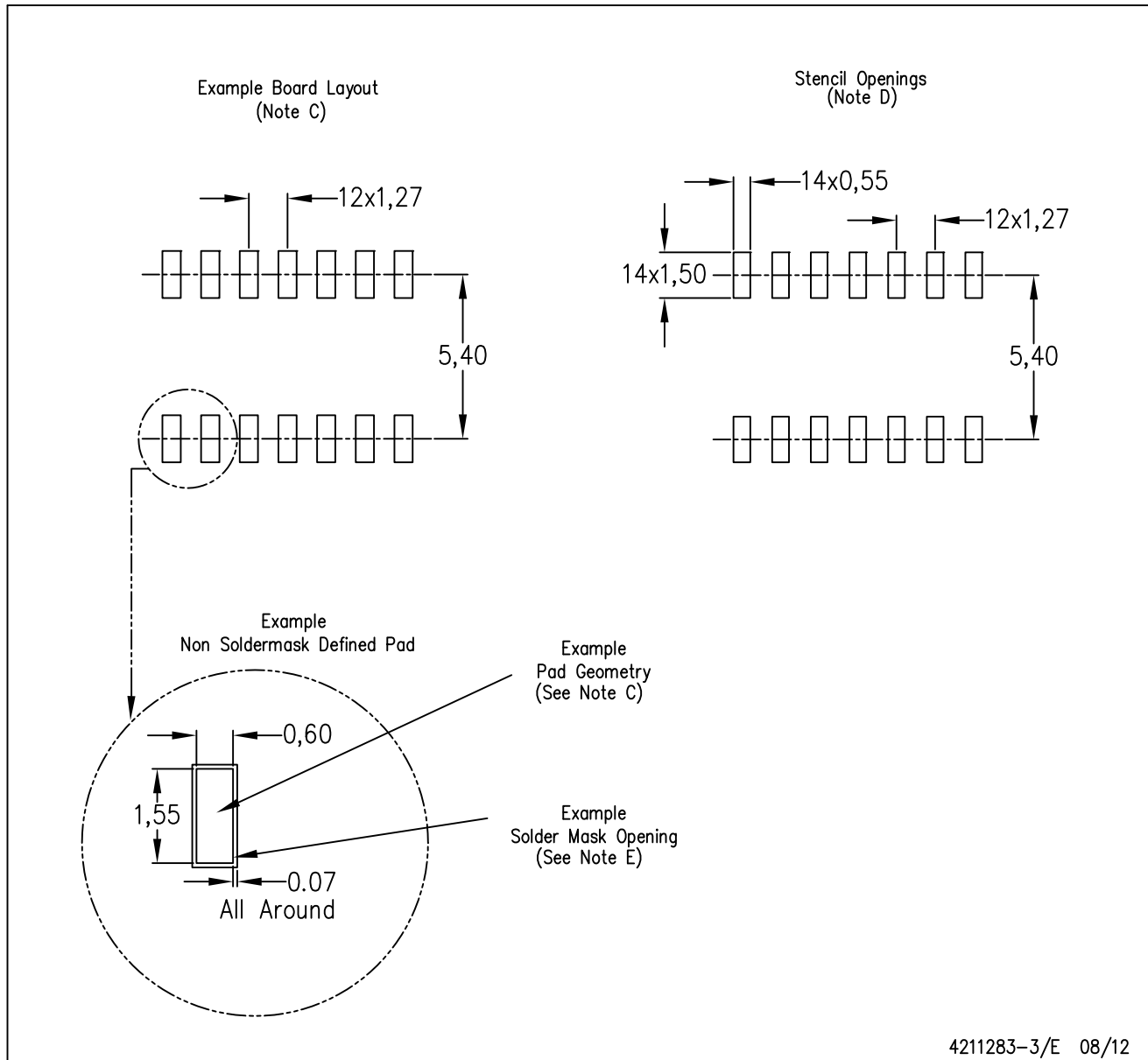


NOTES:

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

D (R-PDSO-G14)

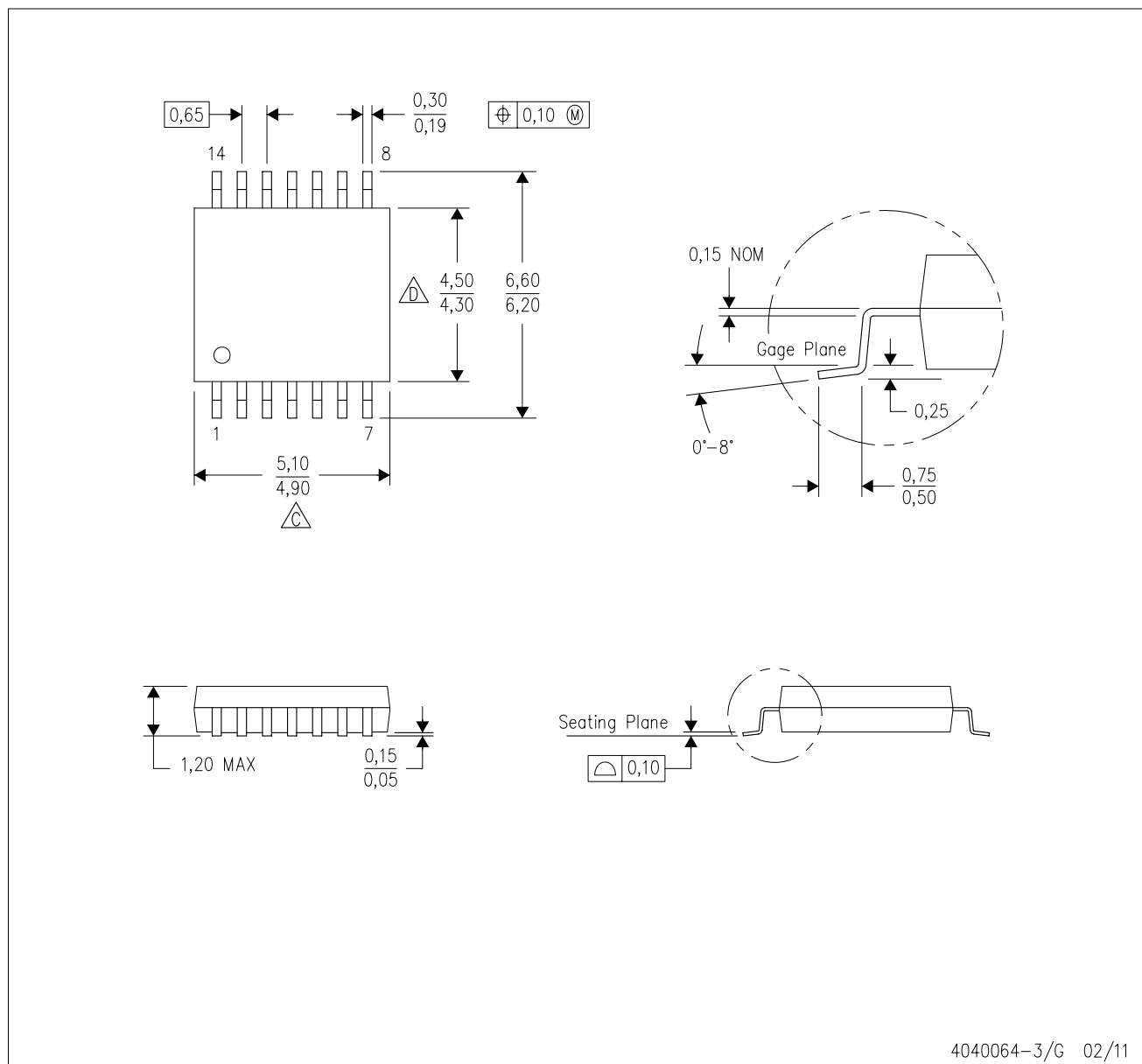
PLASTIC SMALL OUTLINE



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

PW (R-PDSO-G14)

PLASTIC SMALL OUTLINE

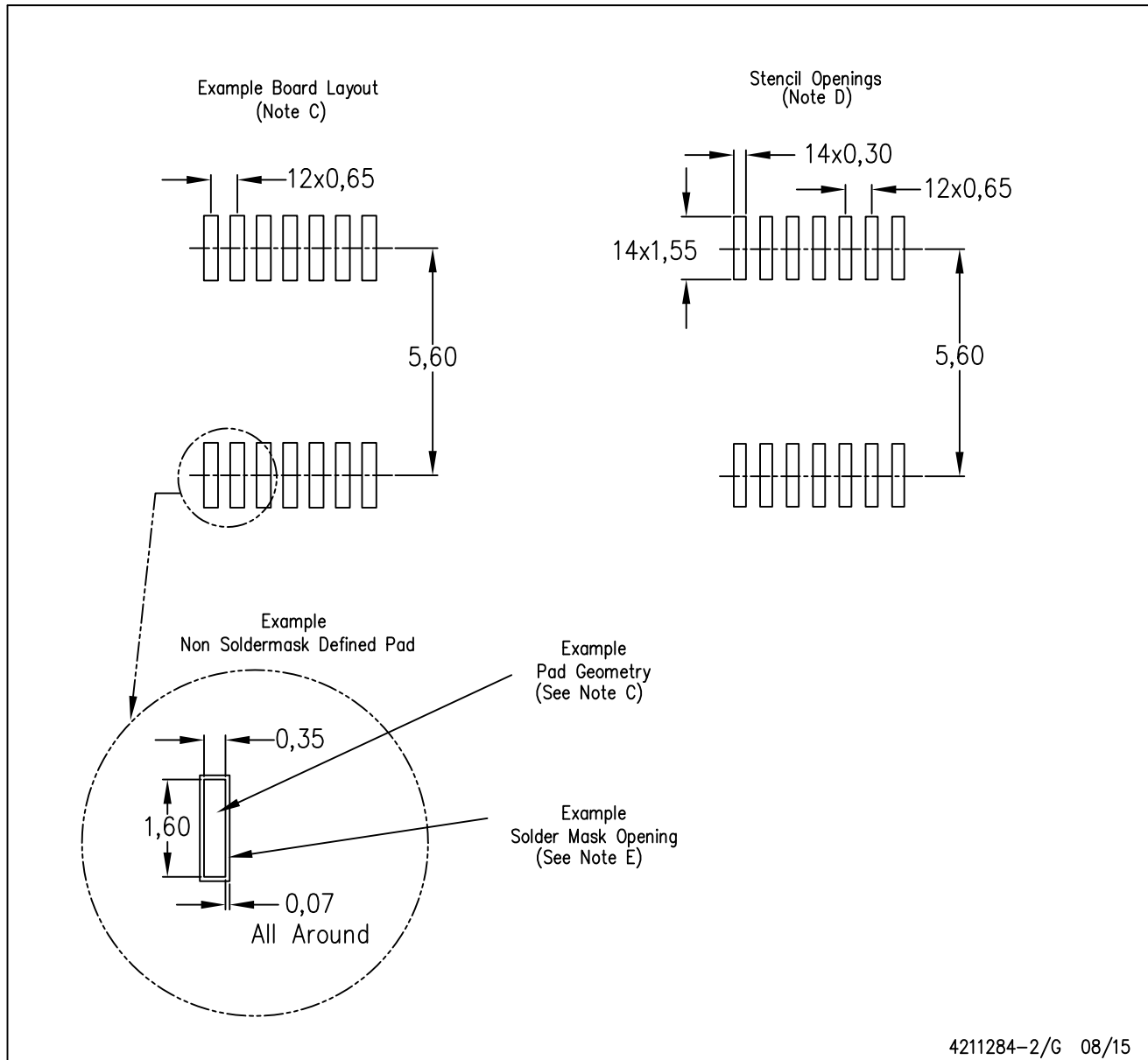


4040064-3/G 02/11

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
  - E. Falls within JEDEC MO-153

PW (R-PDSO-G14)

PLASTIC SMALL OUTLINE

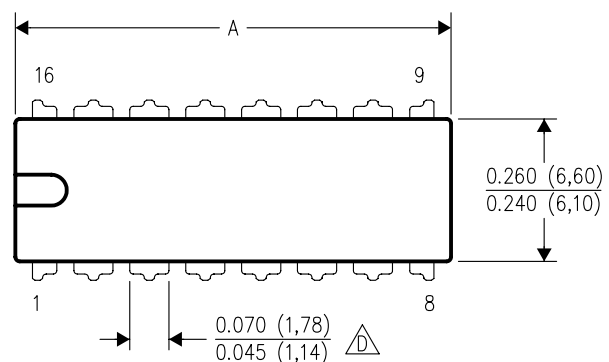


- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers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

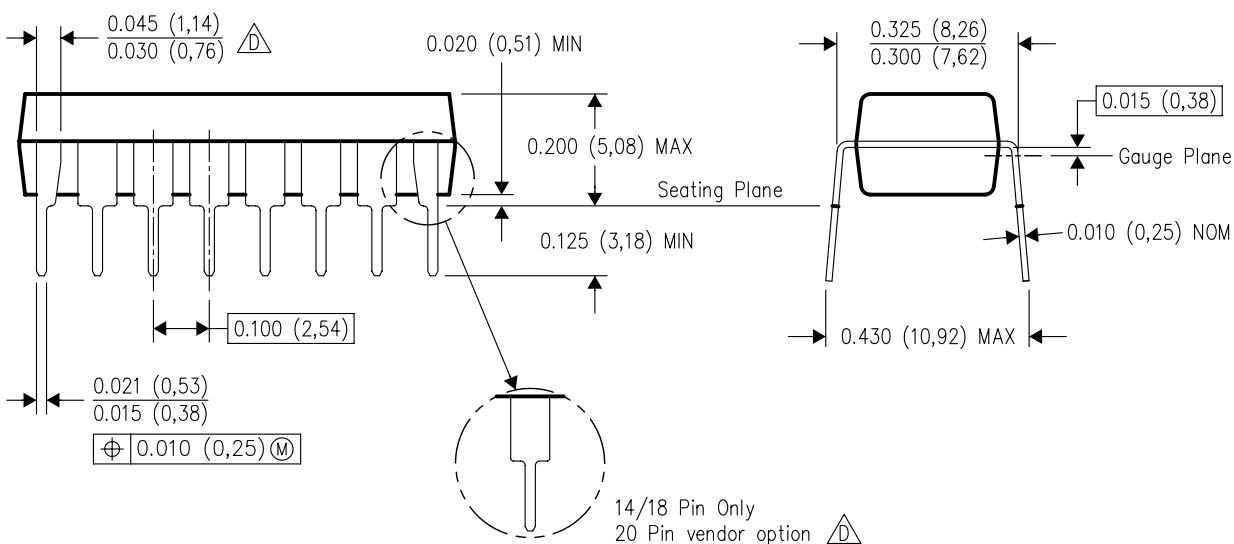
N (R-PDIP-T\*\*)

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



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



4040049/E 12/2002

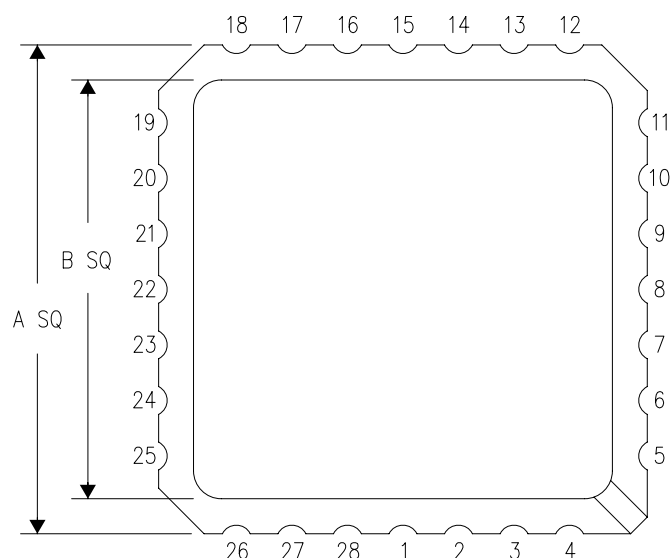
NOTES:

- A. All linear dimensions are in inches (millimeters).  
B. This drawing is subject to change without notice.
-  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.

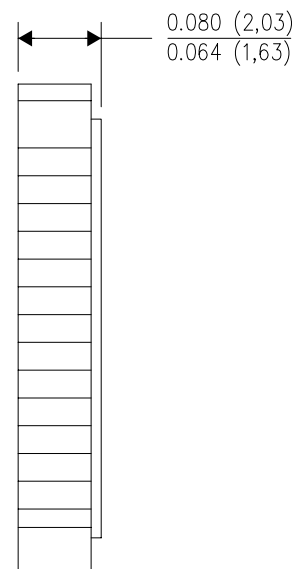
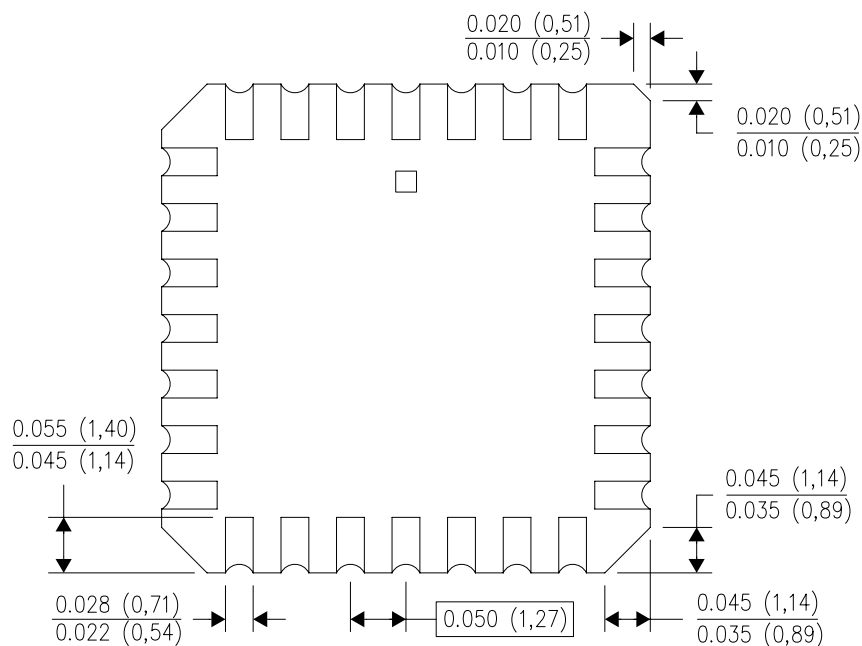
FK (S-CQCC-N\*\*)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



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



4040140/D 01/11

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

# 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.

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