

# SN5486, SN54LS86A, SN54S86 SN7486, SN74LS86A, SN74S86 QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES

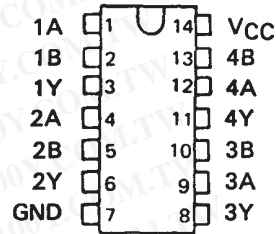
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- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers and Flat Packages, and Standard Plastic and Ceramic 300-mil DIPs

- Dependable Texas Instruments Quality and Reliability

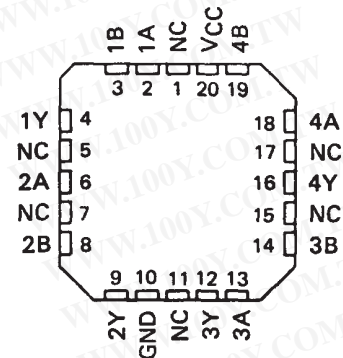
SN5486, SN54LS86A, SN54S86 . . . J OR W PACKAGE  
SN7486 . . . N PACKAGE  
SN74LS86A, SN74S86 . . . D OR N PACKAGE

(TOP VIEW)



SN54LS86A, SN54S86 . . . FK PACKAGE

(TOP VIEW)



NC - No internal connection

| TYPE   | TYPICAL AVERAGE PROPAGATION DELAY TIME | TYPICAL TOTAL POWER DISSIPATION |
|--------|--|---------------------------------|
| '86    | 14 ns                                  | 150 mW                          |
| 'LS86A | 10 ns                                  | 30.5 mW                         |
| 'S86   | 7 ns                                   | 250 mW                          |

## description

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

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

The SN5486, 54LS86A, and the SN54S86 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN7486, SN74LS86A, and the SN74S86 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

## 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 '86 or 'LS86A gate in positive logic; negation may be shown at any two ports.

LOGIC IDENTITY ELEMENT



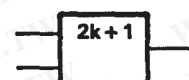
The output is active (low) if all inputs stand at the same logic level (i.e.,  $A=B$ ).

EVEN-PARITY



The output is active (low) if an even number of inputs (i.e., 0 or 2) are active.

ODD-PARITY ELEMENT



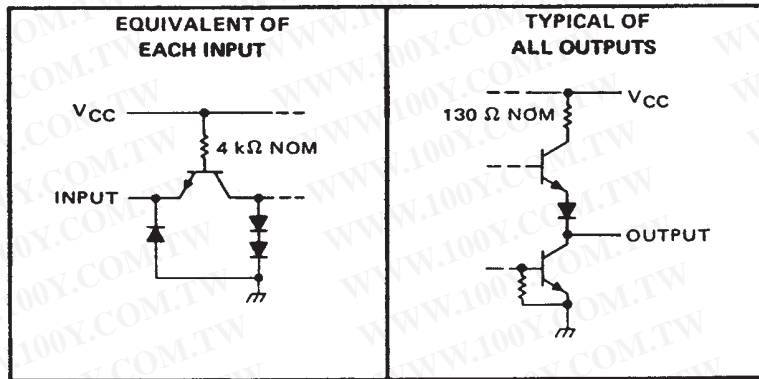
The output is active (high) if an odd number of inputs (i.e., only 1 of the 2) are active.

# SN5486, SN54LS86A, SN54S86 SN7486, SN74LS86A, SN74S86 QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES

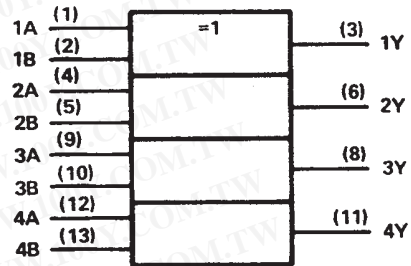
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## schematics of inputs and outputs

'86

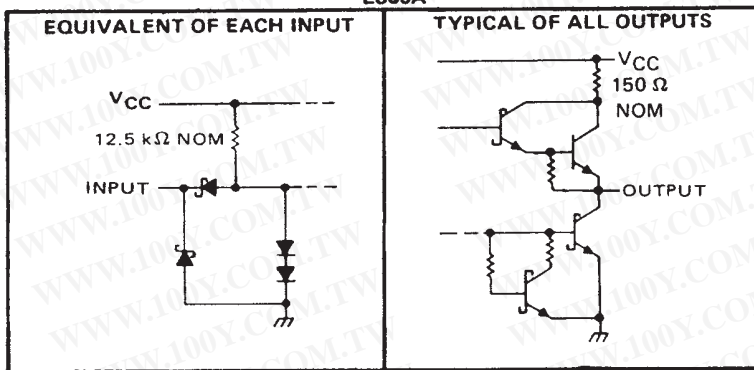


## logic symbol†



†This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12. Pin numbers shown are for D, J, N, and W packages.

'LS86A

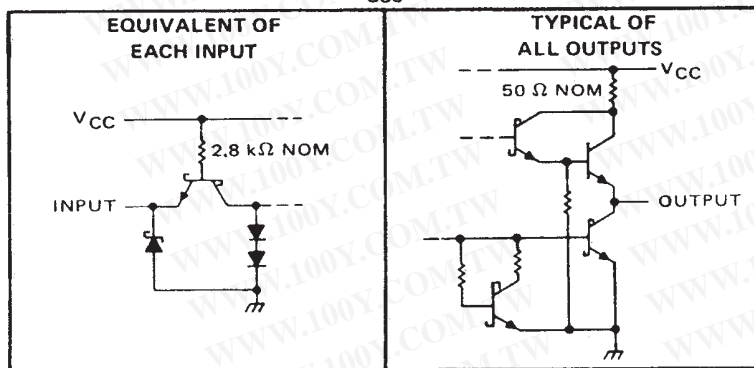


## FUNCTION TABLE

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

H = high level, L = low level

'S86



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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: SN5486 | -55°C to 125°C |
| SN7486                                       | 0°C to 70°C    |
| Storage temperature range                    | -65°C to 150°C |

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

recommended operating conditions

|                                       | SN5486 |     |      | SN7486 |     |      | UNIT    |
|---------------------------------------|--------|-----|------|--------|-----|------|---------|
|                                       | MIN    | NOM | MAX  | MIN    | NOM | MAX  |         |
| Supply voltage, $V_{CC}$              | 4.5    | 5   | 5.5  | 4.75   | 5   | 5.25 | V       |
| High-level output current, $I_{OH}$   |        |     | -800 |        |     | -800 | $\mu$ A |
| Low-level output current, $I_{OL}$    |        |     | 16   |        |     | 16   | mA      |
| Operating free-air temperature, $T_A$ | -55    |     | 125  | 0      |     | 70   | °C      |

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

| PARAMETER                                    | TEST CONDITIONS†   | SN5486 |      |      | SN7486 |      |      | UNIT    |    |
|--|--|--------|------|------|--------|------|------|---------|----|
|  |  | MIN    | TYP‡ | MAX  | MIN    | TYP‡ | MAX  |         |    |
| $V_{IH}$ High-level input voltage            |  | 2      |      |      | 2      |      |      | V       |    |
| $V_{IL}$ Low-level input voltage             |  |        |      | 0.8  |        |      | 0.8  | V       |    |
| $V_{IK}$ Input clamp voltage                 | $V_{CC} = \text{MIN}, I_I = -8 \text{ mA}$   |        |      | -1.5 |        |      | -1.5 | V       |    |
| $V_{OH}$ High-level output voltage           | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OH} = -800 \mu\text{A}$ | 2.4    | 3.4  |      | 2.4    | 3.4  |      | V       |    |
| $V_{OL}$ Low-level output voltage            | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OL} = 16 \text{ mA}$    |        | 0.2  | 0.4  |        | 0.2  | 0.4  | V       |    |
| $I_I$ Input current at maximum input voltage | $V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$   |        |      | 1    |        |      | 1    | mA      |    |
| $I_{IH}$ High-level input current            | $V_{CC} = \text{MAX}, V_I = 2.4 \text{ V}$   |        |      | 40   |        |      | 40   | $\mu$ A |    |
| $I_{IL}$ Low-level input current             | $V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$   |        |      | -1.6 |        |      | -1.6 | mA      |    |
| $I_{OS}$ Short-circuit output current§       | $V_{CC} = \text{MAX}$  |        |      | -20  |        | -55  | -18  | -55     | mA |
| $I_{CC}$ Supply current                      | $V_{CC} = \text{MAX}, \text{ See Note 2}$  |        |      | 30   |        | 43   | 30   | 50      | mA |

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

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

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

NOTE 2:  $I_{CC}$  is measured with the inputs grounded and the outputs open.

switching characteristics,  $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$

| PARAMETER¶ | FROM (INPUT) | TEST CONDITIONS  |  | MIN | TYP | MAX | UNIT |    |
|------------|--------------|------------------|--|-----|-----|-----|------|----|
|            |              | Other input low  | Other input high                                       |     |     |     |      |    |
| $t_{PLH}$  | A or B       | Other input low  | $C_L = 15 \text{ pF}, R_L = 400 \Omega,$<br>See Note 3 |     |     | 15  | 23   | ns |
| $t_{PHL}$  |              |                  |  |     |     | 11  | 17   |    |
| $t_{PLH}$  | A or B       | Other input high |  |     |     | 18  | 30   | ns |
| $t_{PHL}$  |              |                  |  |     |     | 13  | 22   |    |

¶  $t_{PLH}$  = propagation delay time, low-to-high-level output

¶  $t_{PHL}$  = propagation delay time, high-to-low-level output

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

# SN5486, SN54LS86A, SN54S86 SN7486, SN74LS86A, SN74S86 QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES

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

|   |                |
|---|----------------|
| Supply voltage, $V_{CC}$ (see Note 1)           | 7 V            |
| Input voltage                                   | 7 V            |
| Operating free-air temperature range: SN54LS86A | -55°C to 125°C |
| SN74LS86A                                       | 0°C to 70°C    |
| Storage temperature range                       | -65°C to 150°C |

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

## recommended operating conditions

|                                       | SN54LS86A |     |      | SN74LS86A |     |      | UNIT    |
|---------------------------------------|-----------|-----|------|-----------|-----|------|---------|
|                                       | MIN       | NOM | MAX  | MIN       | NOM | MAX  |         |
| Supply voltage, $V_{CC}$              | 4.5       | 5   | 5.5  | 4.75      | 5   | 5.25 | V       |
| High-level output current, $I_{OH}$   |           |     | -400 |           |     | -400 | $\mu$ A |
| Low-level output current, $I_{OL}$    |           |     | 4    |           |     | 8    | mA      |
| Operating free-air temperature, $T_A$ | -55       |     | 125  | 0         |     | 70   | °C      |

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

| PARAMETER                                    | TEST CONDITIONS†  | SN54LS86A |      | SN74LS86A |      | UNIT    |      |
|--|---|-----------|------|-----------|------|---------|------|
|  |   | MIN       | TYP‡ | MAX       | MIN  |         | TYP‡ |
| $V_{IH}$ High-level input voltage            |   | 2         |      | 2         |      | V       |      |
| $V_{IL}$ Low-level input voltage             |   |           |      | 0.7       |      | 0.8     | V    |
| $V_{IK}$ Input clamp voltage                 | $V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$   |           |      | -1.5      |      | -1.5    | V    |
| $V_{OH}$ High-level output voltage           | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = V_{IL \text{ max}}, I_{OH} = -400 \mu\text{A}$ | 2.5       | 3.4  | 2.7       | 3.4  | V       |      |
| $V_{OL}$ Low-level output voltage            | $V_{CC} = \text{MIN}, I_{OL} = 4 \text{ mA}$  | 0.25      | 0.4  | 0.25      | 0.4  | V       |      |
|  | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = V_{IL \text{ max}}, I_{OL} = 8 \text{ mA}$     |           |      | 0.35      | 0.5  |         |      |
| $I_I$ Input current at maximum input voltage | $V_{CC} = \text{MAX}, V_I = 7 \text{ V}$  |           | 0.2  |           | 0.2  | mA      |      |
| $I_{IH}$ High-level input current            | $V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$  |           | 40   |           | 40   | $\mu$ A |      |
| $I_{IL}$ Low-level input current             | $V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$  |           | -0.8 |           | -0.8 | mA      |      |
| $I_{OS}$ Short-circuit output current§       | $V_{CC} = \text{MAX}$   | -20       | -100 | -20       | -100 | mA      |      |
| $I_{CC}$ Supply current                      | $V_{CC} = \text{MAX},$ See Note 2   | 6.1       | 10   | 6.1       | 10   | mA      |      |

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

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

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

NOTE 2:  $I_{CC}$  is measured with the inputs grounded and the outputs open.

## switching characteristics, $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$

| PARAMETER¶ | FROM (INPUT) | TEST CONDITIONS  | MIN | TYP | MAX | UNIT |
|------------|--------------|--|-----|-----|-----|------|
|            |              |  |     |     |     |      |
| $t_{PLH}$  | A or B       | Other input low<br>$C_L = 15 \text{ pF}, R_L = 2 \text{ k}\Omega,$<br>See Note 3 |     | 12  | 23  | ns   |
| $t_{PHL}$  |              |  |     | 10  | 17  |      |
| $t_{PLH}$  | A or B       | Other input high   |     | 20  | 30  | ns   |
| $t_{PHL}$  |              |  |     | 13  | 22  |      |

¶  $t_{PLH}$  = propagation delay time, low-to-high-level output

$t_{PHL}$  = propagation delay time, high-to-low-level output

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

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**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: SN54S86 | -55°C to 125°C |
| SN74S86                                       | 0°C to 70°C    |
| Storage temperature range                     | -65°C to 150°C |

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

**recommended operating conditions**

|                                       | SN54S86 |     |     | SN74S86 |     |      | UNIT |
|---------------------------------------|---------|-----|-----|---------|-----|------|------|
|                                       | MIN     | NOM | MAX | MIN     | NOM | MAX  |      |
| Supply voltage, $V_{CC}$              | 4.5     | 5   | 5.5 | 4.75    | 5   | 5.25 | V    |
| High-level output current, $I_{OH}$   |         |     | -1  |         |     | -1   | mA   |
| Low-level output current, $I_{OL}$    |         |     | 20  |         |     | 20   | mA   |
| Operating free-air temperature, $T_A$ | -55     |     | 125 | 0       |     | 70   | °C   |

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

| PARAMETER                                    | TEST CONDITIONS†  | SN54S86 |      |      | SN74S86 |      |      | UNIT |
|--|---|---------|------|------|---------|------|------|------|
|  |   | MIN     | TYP‡ | MAX  | MIN     | TYP‡ | MAX  |      |
| $V_{IH}$ High-level input voltage            |   | 2       |      |      | 2       |      |      | V    |
| $V_{IL}$ Low-level input voltage             |   |         |      | 0.8  |         |      | 0.8  | V    |
| $V_{IK}$ Input clamp voltage                 | $V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$   |         |      | -1.2 |         |      | -1.2 | V    |
| $V_{OH}$ High-level output voltage           | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OH} = -1 \text{ mA}$ | 2.5     | 3.4  |      | 2.7     | 3.4  |      | V    |
| $V_{OL}$ Low-level output voltage            | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OL} = 20 \text{ mA}$ |         |      | 0.5  |         |      | 0.5  | V    |
| $I_I$ Input current at maximum input voltage | $V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$  |         |      | 1    |         |      | 1    | mA   |
| $I_{IH}$ High-level input current            | $V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$  |         |      | 50   |         |      | 50   | µA   |
| $I_{IL}$ Low-level input current             | $V_{CC} = \text{MAX}, V_I = 0.5 \text{ V}$  |         |      | -2   |         |      | -2   | mA   |
| $I_{OS}$ Short-circuit output current §      | $V_{CC} = \text{MAX}$   | -40     |      | -100 | -40     |      | -100 | mA   |
| $I_{CC}$ Supply current                      | $V_{CC} = \text{MAX}, \text{ See Note 2}$   |         | 50   | 75   |         | 50   | 75   | mA   |

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

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

§ Not more than one output should be shorted at a time, and duration of the short-circuit should not exceed one second.

NOTE 2:  $I_{CC}$  is measured with the inputs grounded and the outputs open.

**switching characteristics,  $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$**

| PARAMETER¶ | FROM (INPUT) | TEST CONDITIONS  |   | MIN | TYP | MAX  | UNIT |
|------------|--------------|------------------|---|-----|-----|------|------|
|            |              | Other input low  | Other input high  |     |     |      |      |
| $t_{PLH}$  | A or B       | Other input low  | $C_L = 15 \text{ pF}, R_L = 280 \Omega, \text{ See Note 3}$ | 7   | 6.5 | 10.5 | ns   |
| $t_{PHL}$  |              |                  |   |     |     |      |      |
| $t_{PLH}$  | A or B       | Other input high | $C_L = 15 \text{ pF}, R_L = 280 \Omega, \text{ See Note 3}$ | 7   | 6.5 | 10.5 | ns   |
| $t_{PHL}$  |              |                  |   |     |     |      |      |

¶  $t_{PLH}$  = propagation delay time, low-to-high-level output

$t_{PHL}$  = propagation delay time, high-to-low-level output

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

PACKAGING INFORMATION

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/Ball Finish | MSL Peak Temp <sup>(3)</sup> |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| JM38510/07501BCA | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| JM38510/07501BDA | ACTIVE                | CFP          | W               | 14   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| JM38510/07501BDA | ACTIVE                | CFP          | W               | 14   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| JM38510/30502B2A | ACTIVE                | LCCC         | FK              | 20   | 1           | TBD                     | POST-PLATE       | N / A for Pkg Type           |
| JM38510/30502B2A | ACTIVE                | LCCC         | FK              | 20   | 1           | TBD                     | POST-PLATE       | N / A for Pkg Type           |
| JM38510/30502BCA | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| JM38510/30502BCA | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| JM38510/30502BDA | ACTIVE                | CFP          | W               | 14   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| JM38510/30502BDA | ACTIVE                | CFP          | W               | 14   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| SN5486J          | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| SN5486J          | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| SN54LS86AJ       | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| SN54LS86AJ       | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| SN54S86J         | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| SN54S86J         | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| SN7486N          | OBSOLETE              | PDIP         | N               | 14   |             | TBD                     | Call TI          | Call TI                      |
| SN7486N          | OBSOLETE              | PDIP         | N               | 14   |             | TBD                     | Call TI          | Call TI                      |
| SN7486N3         | OBSOLETE              | PDIP         | N               | 14   |             | TBD                     | Call TI          | Call TI                      |
| SN7486N3         | OBSOLETE              | PDIP         | N               | 14   |             | TBD                     | Call TI          | Call TI                      |
| SN74LS86AD       | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86AD       | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86ADE4     | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86ADE4     | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86ADG4     | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86ADG4     | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86ADR      | ACTIVE                | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86ADR      | ACTIVE                | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86ADRE4    | ACTIVE                | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86ADRE4    | ACTIVE                | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86ADRG4    | ACTIVE                | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86ADRG4    | ACTIVE                | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86AN       | ACTIVE                | PDIP         | N               | 14   | 25          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN74LS86AN       | ACTIVE                | PDIP         | N               | 14   | 25          | Pb-Free                 | CU NIPDAU        | N / A for Pkg Type           |

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/Ball Finish | MSL Peak Temp <sup>(3)</sup> |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| (RoHS)           |                       |              |                 |      |             |                         |                  |                              |
| SN74LS86AN3      | OBSOLETE              | PDIP         | N               | 14   |             | TBD                     | Call TI          | Call TI                      |
| SN74LS86AN3      | OBSOLETE              | PDIP         | N               | 14   |             | TBD                     | Call TI          | Call TI                      |
| SN74LS86ANE4     | ACTIVE                | PDIP         | N               | 14   | 25          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN74LS86ANE4     | ACTIVE                | PDIP         | N               | 14   | 25          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN74LS86ANSR     | ACTIVE                | SO           | NS              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86ANSR     | ACTIVE                | SO           | NS              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86ANSRE4   | ACTIVE                | SO           | NS              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86ANSRE4   | ACTIVE                | SO           | NS              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86ANSRG4   | ACTIVE                | SO           | NS              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74LS86ANSRG4   | ACTIVE                | SO           | NS              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86D         | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86D         | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86DE4       | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86DE4       | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86DG4       | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86DG4       | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86DR        | ACTIVE                | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86DR        | ACTIVE                | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86DRE4      | ACTIVE                | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86DRE4      | ACTIVE                | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86DRG4      | ACTIVE                | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86DRG4      | ACTIVE                | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86N         | ACTIVE                | PDIP         | N               | 14   | 25          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN74S86N         | ACTIVE                | PDIP         | N               | 14   | 25          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN74S86N3        | OBSOLETE              | PDIP         | N               | 14   |             | TBD                     | Call TI          | Call TI                      |
| SN74S86N3        | OBSOLETE              | PDIP         | N               | 14   |             | TBD                     | Call TI          | Call TI                      |
| SN74S86NE4       | ACTIVE                | PDIP         | N               | 14   | 25          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/Ball Finish | MSL Peak Temp <sup>(3)</sup> |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| SN74S86NE4       | ACTIVE                | PDIP         | N               | 14   | 25          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN74S86NSR       | ACTIVE                | SO           | NS              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86NSR       | ACTIVE                | SO           | NS              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86NSRE4     | ACTIVE                | SO           | NS              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86NSRE4     | ACTIVE                | SO           | NS              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86NSRG4     | ACTIVE                | SO           | NS              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN74S86NSRG4     | ACTIVE                | SO           | NS              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SNJ5486J         | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| SNJ5486J         | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| SNJ5486W         | ACTIVE                | CFP          | W               | 14   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| SNJ5486W         | ACTIVE                | CFP          | W               | 14   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| SNJ54LS86AFK     | ACTIVE                | LCCC         | FK              | 20   | 1           | TBD                     | POST-PLATE       | N / A for Pkg Type           |
| SNJ54LS86AFK     | ACTIVE                | LCCC         | FK              | 20   | 1           | TBD                     | POST-PLATE       | N / A for Pkg Type           |
| SNJ54LS86AJ      | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| SNJ54LS86AJ      | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| SNJ54LS86AW      | ACTIVE                | CFP          | W               | 14   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| SNJ54LS86AW      | ACTIVE                | CFP          | W               | 14   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| SNJ54S86FK       | ACTIVE                | LCCC         | FK              | 20   | 1           | TBD                     | POST-PLATE       | N / A for Pkg Type           |
| SNJ54S86FK       | ACTIVE                | LCCC         | FK              | 20   | 1           | TBD                     | POST-PLATE       | N / A for Pkg Type           |
| SNJ54S86J        | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| SNJ54S86J        | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42 SNPB         | N / A for Pkg Type           |
| SNJ54S86W        | ACTIVE                | CFP          | W               | 14   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| SNJ54S86W        | ACTIVE                | CFP          | W               | 14   | 1           | TBD                     | A42              | N / A for Pkg Type           |

<sup>(1)</sup> 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.

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

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

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

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

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

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

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

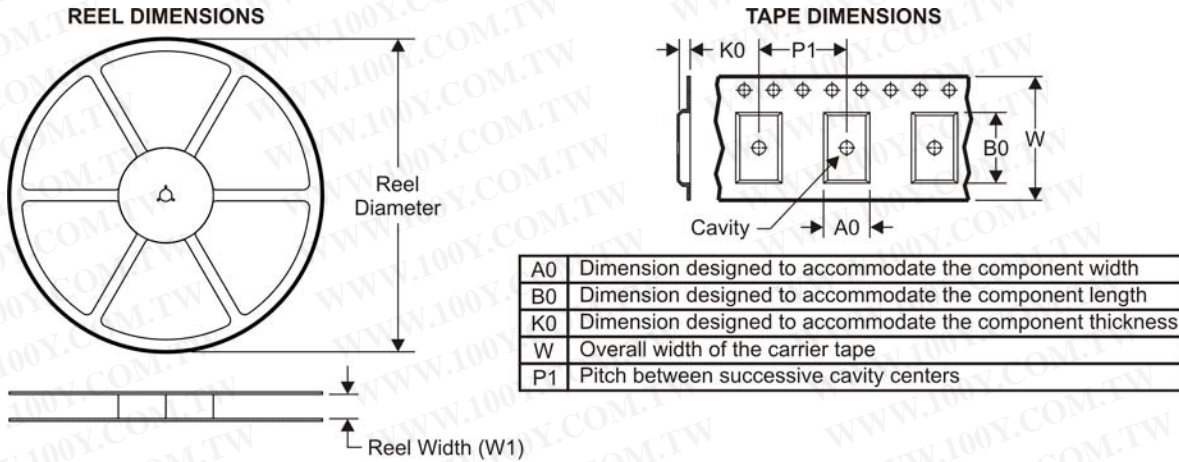
temperature.

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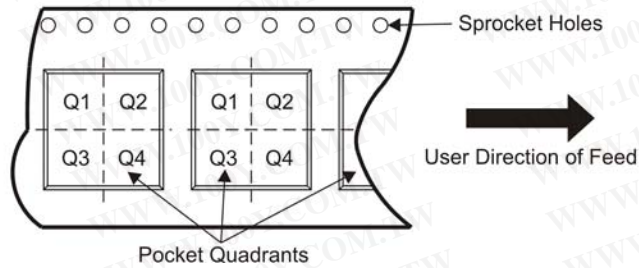
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**TAPE AND REEL INFORMATION**



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

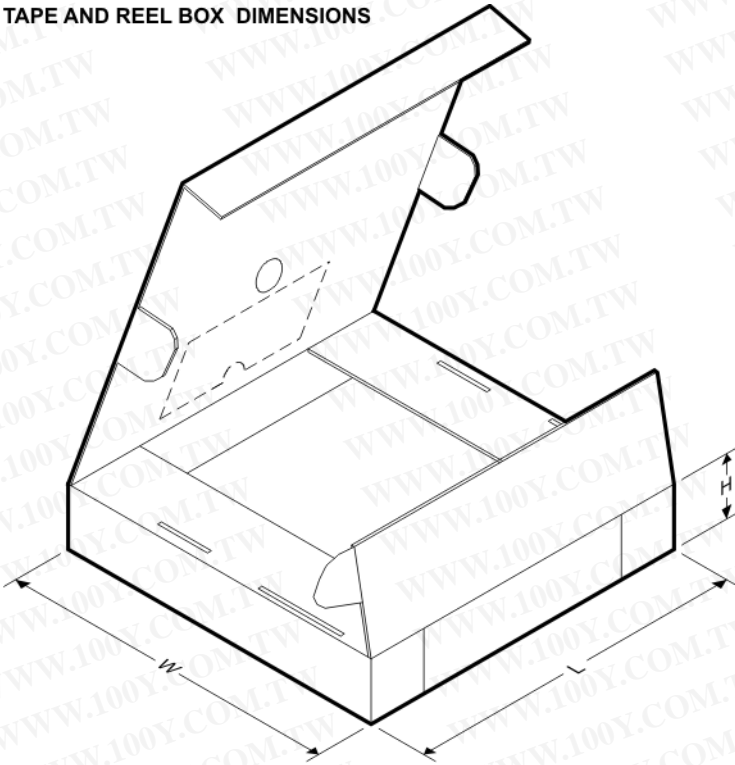


\*All dimensions are nominal

| 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 |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74LS86ADR  | SOIC         | D               | 14   | 2500 | 330.0              | 16.0               | 7.0     | 9.0     | 2.0     | 8.0     | 16.0   | Q1            |
| SN74LS86ANSR | SO           | NS              | 14   | 2000 | 330.0              | 16.0               | 8.0     | 11.0    | 3.0     | 12.0    | 16.0   | Q1            |
| SN74S86DR    | SOIC         | D               | 14   | 2500 | 330.0              | 16.0               | 7.0     | 9.0     | 2.0     | 8.0     | 16.0   | Q1            |
| SN74S86NSR   | SO           | NS              | 14   | 2000 | 330.0              | 16.0               | 8.0     | 11.0    | 3.0     | 12.0    | 16.0   | Q1            |

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**TAPE AND REEL BOX DIMENSIONS**



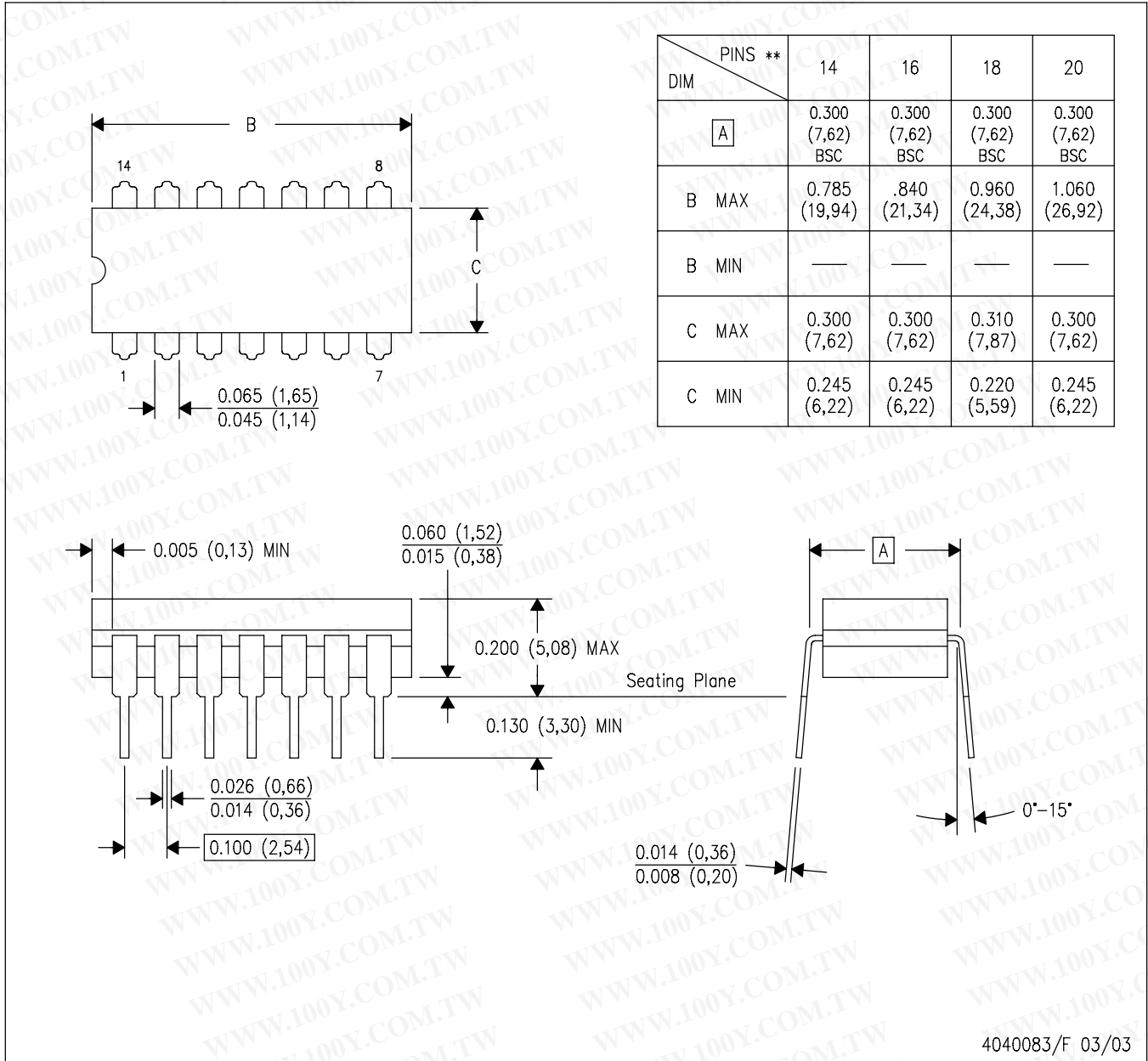
\*All dimensions are nominal

| Device       | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74LS86ADR  | SOIC         | D               | 14   | 2500 | 346.0       | 346.0      | 33.0        |
| SN74LS86ANSR | SO           | NS              | 14   | 2000 | 346.0       | 346.0      | 33.0        |
| SN74S86DR    | SOIC         | D               | 14   | 2500 | 346.0       | 346.0      | 33.0        |
| SN74S86NSR   | SO           | NS              | 14   | 2000 | 346.0       | 346.0      | 33.0        |

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J (R-GDIP-T\*\*)  
14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



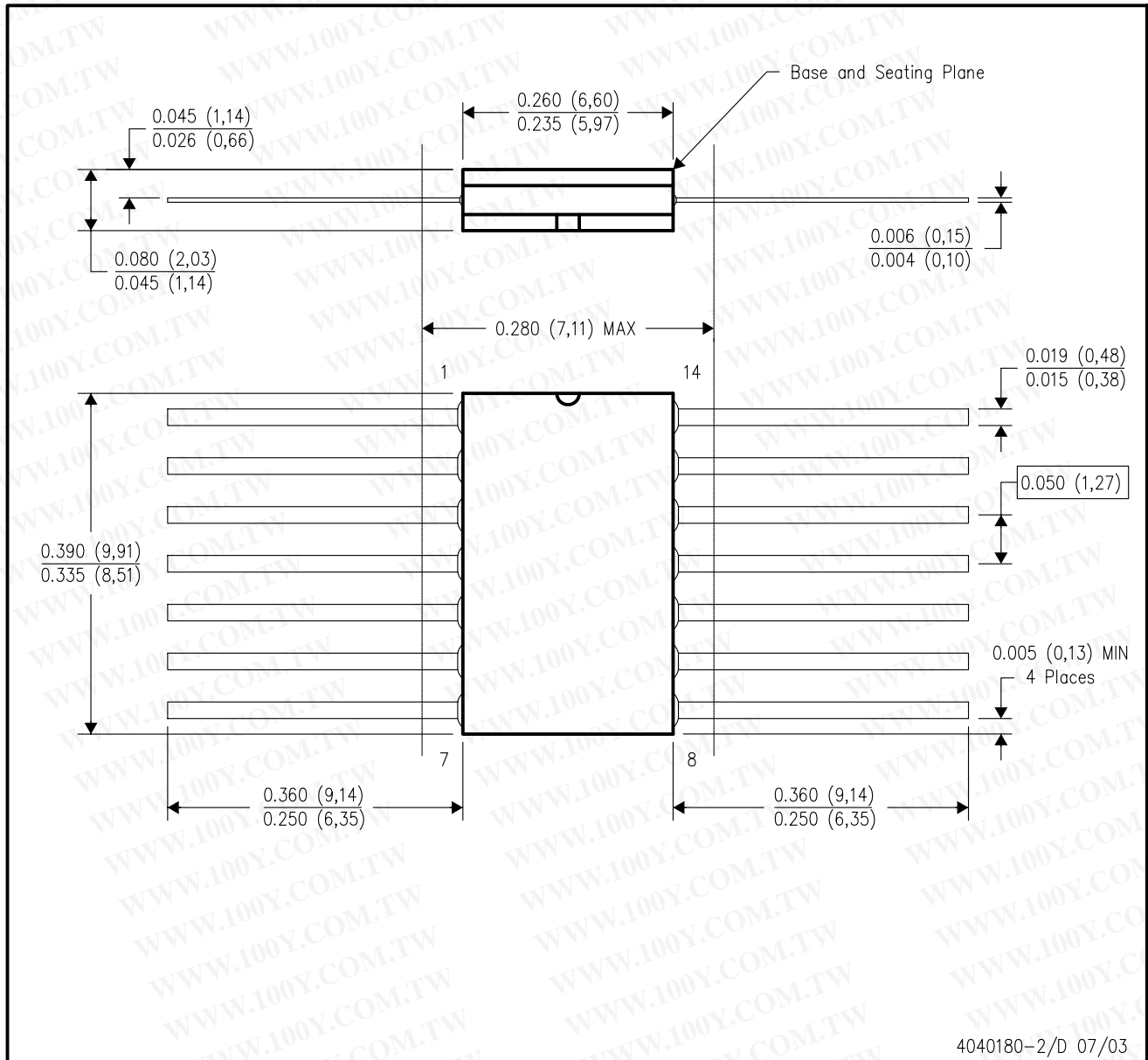
4040083/F 03/03

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

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W (R-GDFP-F14)

CERAMIC DUAL FLATPACK



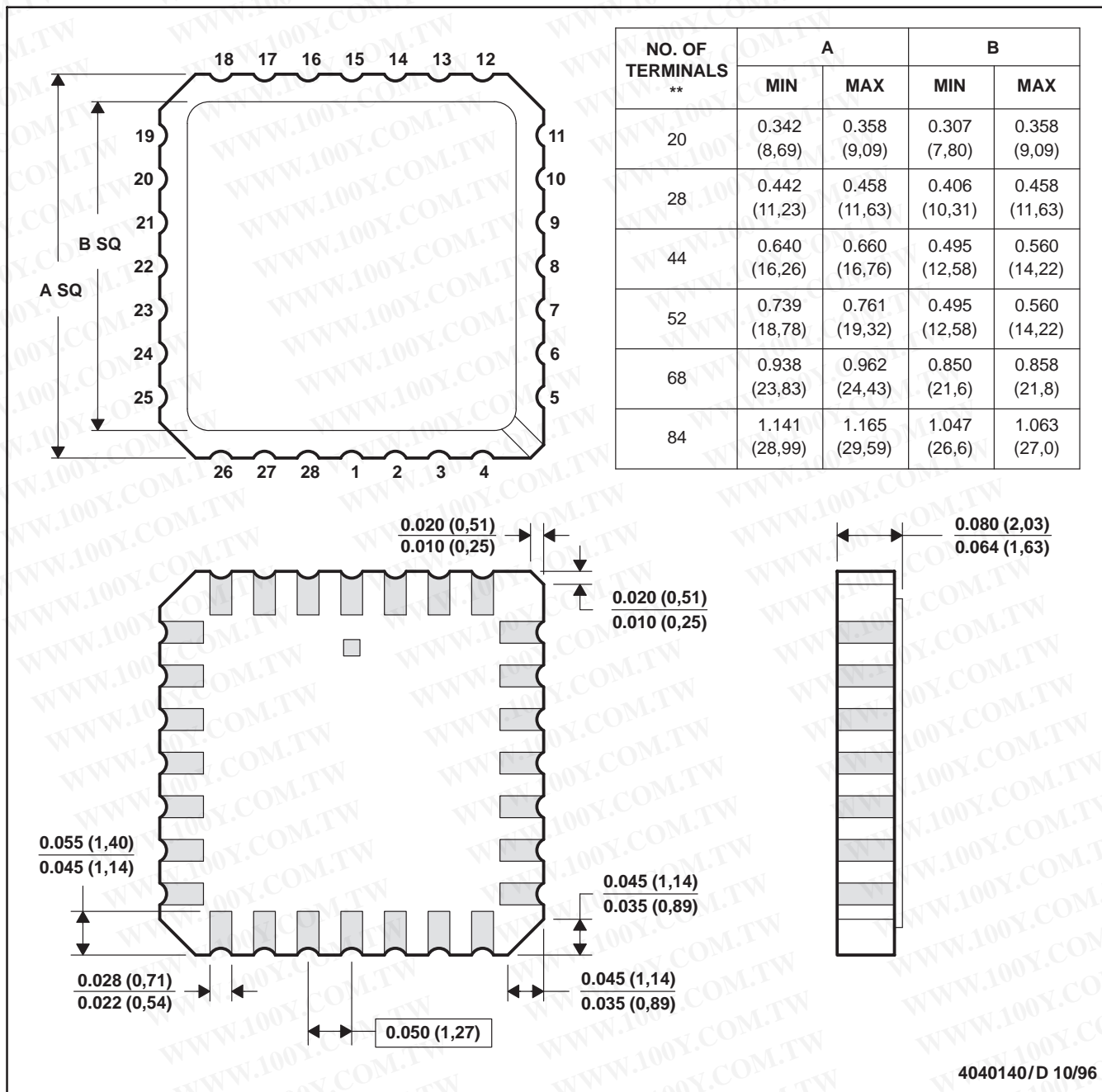
- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package can be hermetically sealed with a ceramic lid using glass frit.
  - D. Index point is provided on cap for terminal identification only.
  - E. Falls within MIL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

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

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



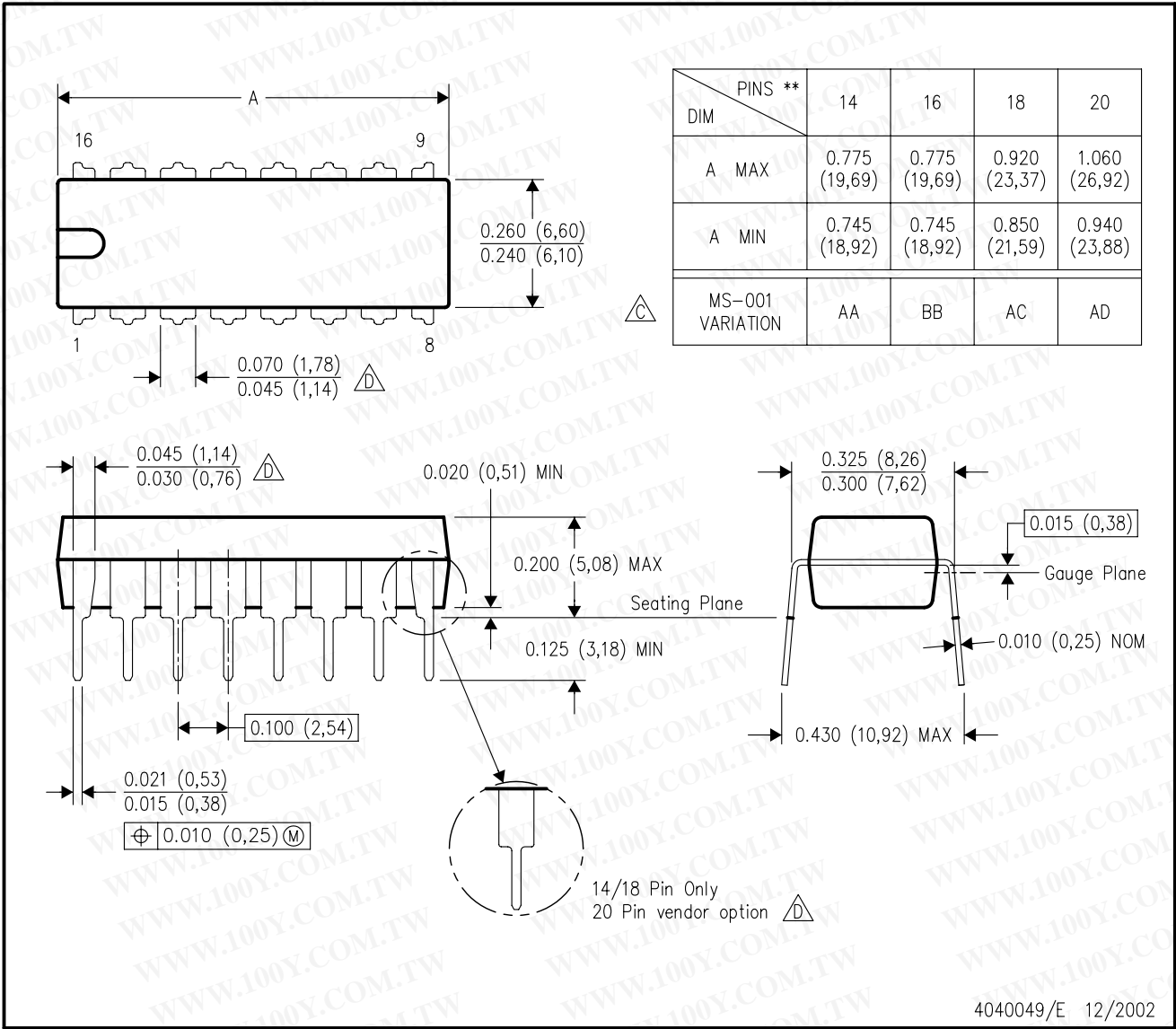
- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package can be hermetically sealed with a metal lid.
  - D. The terminals are gold plated.
  - E. Falls within JEDEC MS-004

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

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



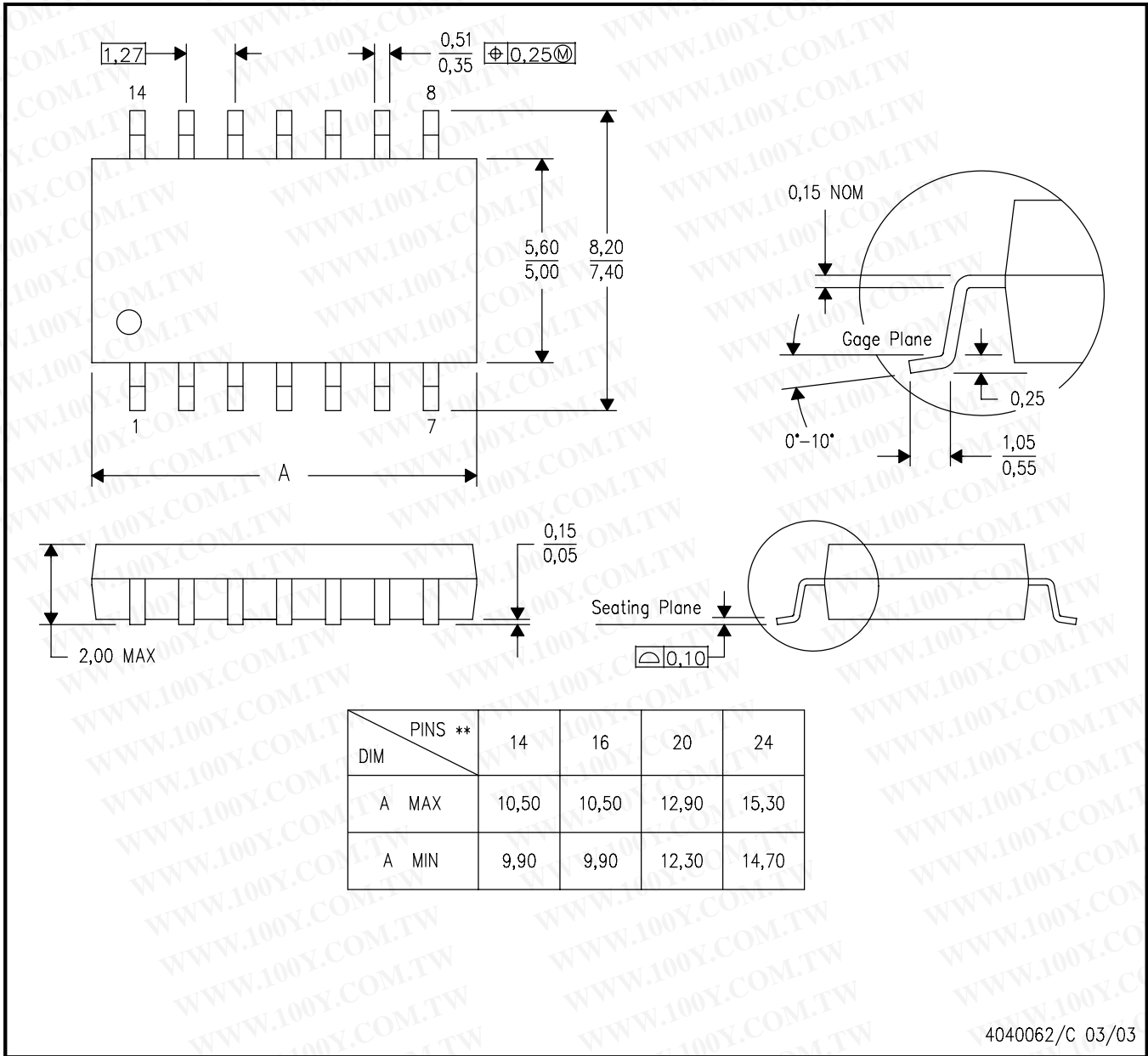
- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - D The 20 pin end lead shoulder width is a vendor option, either half or full width.



# MECHANICAL DATA

NS (R-PDSO-G\*\*)  
14-PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



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

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