- **Generates Either Odd or Even Parity for Nine Data Lines**

- **Cascadable for n-Bits**

- **Can Be Used to Upgrade Existing Systems using MSI Parity Circuits**

- **Typical Data-to-Output Delay of Only 14 ns for 'S280 and 33 ns for 'LS280**

- **Typical Power Dissipation:**
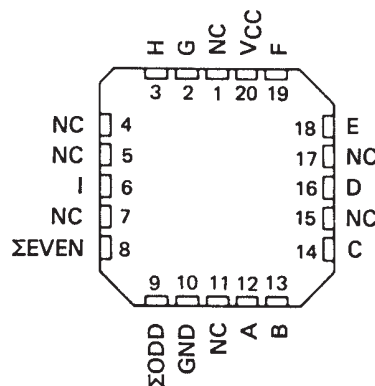    **'LS280 . . . 80 mW**
    **'S280 . . . 335 mW**

**SN54LS280, SN54S280 . . . J OR W PACKAGE**
**SN74LS280, SN74S280 . . . D OR N PACKAGE**
**(TOP VIEW)**

```
        G  []1  U  14[] VCC
        H  []2     13[] F
       NC  []3     12[] E
        I  []4     11[] D
    ΣEVEN  []5     10[] C
     ΣODD  []6      9[] B
      GND  []7      8[] A
```
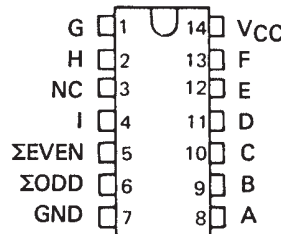
**SN54LS280, SN54S280 . . . FK PACKAGE**
**(TOP VIEW)**

```
          H  G  NC VCC F
          3  2  1  20 19
    NC []4              18[] E
    NC []5              17[] NC
     I []6              16[] D
    NC []7              15[] NC
 ΣEVEN []8              14[] C
          9 10 11 12 13
        ΣODD GND NC A B
```

NC – No internal connection

### FUNCTION TABLE

| NUMBER OF INPUTS A THRU I THAT ARE HIGH | OUTPUTS | |
|---|---|---|
| | $\Sigma$ EVEN | $\Sigma$ ODD |
| 0, 2, 4, 6, 8 | H | L |
| 1, 3, 5, 7, 9 | L | H |

H = high level, L = low level

### logic symbol[†]



```
   A  (8) ─────┐ 2k
   B  (9) ─────┤
   C  (10)─────┤
   D  (11)─────┤
   E  (12)─────┤         (5)  Σ
   F  (13)─────┤              EVEN
   G  (1) ─────┤         (6)  Σ
   H  (2) ─────┤              ODD
   I  (4) ─────┘
```
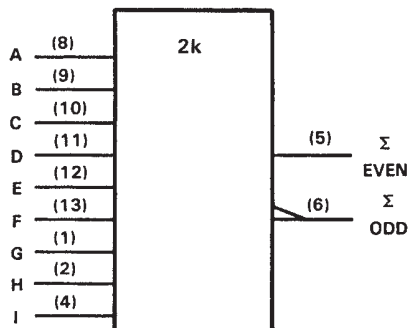
[†]This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.
Pin numbers shown are for D, J, N, and W packages.

### description

These universal, monolithic, nine-bit parity generators/checkers utilize Schottky-clamped TTL high-performance circuitry and feature odd/even outputs to faciliate operation of either odd or even parity application. The word-length capability is easily expanded by cascading as shown under typical application data.

Series 54LS/74LS and Series 54S/74S parity generators/checkers offer the designer a trade-off between reduced power consumption and high performance. These devices can be used to upgrade the performance of most systems utilizing the '180 parity generator/checker. Although the 'LS280 and 'S280 are implemented without expander inputs, the corresponding function is provided by the availability of an input at pin 4 and the absence of any internal connection at pin 3. This permits the 'LS280 and 'S280 to be substituted for the '180 in existing designs to produce an identical function even if 'LS280's and 'S280's are mixed with existing '180's.
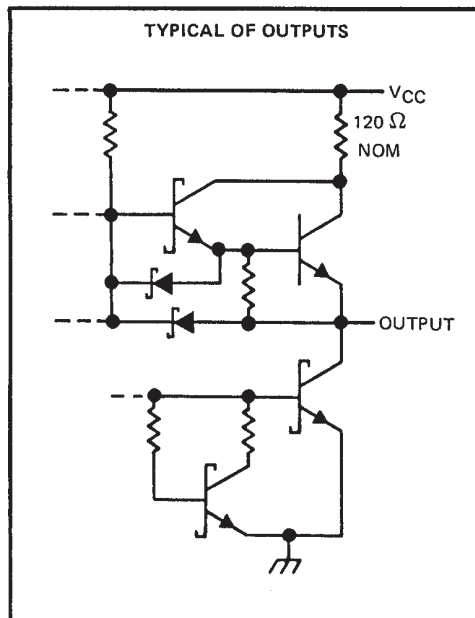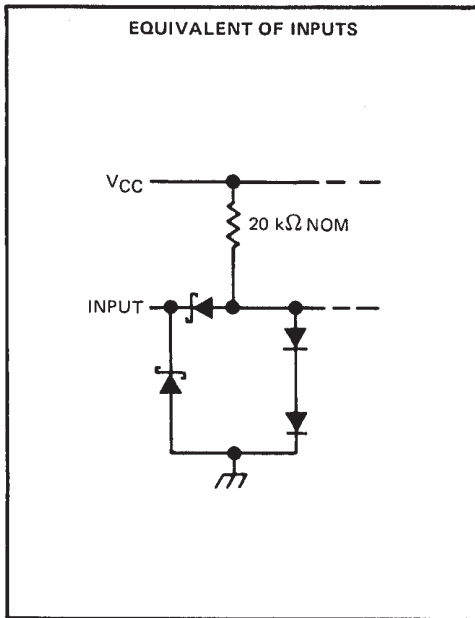
These devices are fully compatible with most other TTL circuits. All 'LS280 and 'S280 inputs are buffered to lower the drive requirements to one Series 54LS/74LS or Series 54S/74S standard load, respectively.

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**TEXAS INSTRUMENTS**

## schematics of inputs and outputs

### 'LS280



EQUIVALENT OF INPUTS

TYPICAL OF OUTPUTS

### 'S280



EQUIVALENT OF INPUTS

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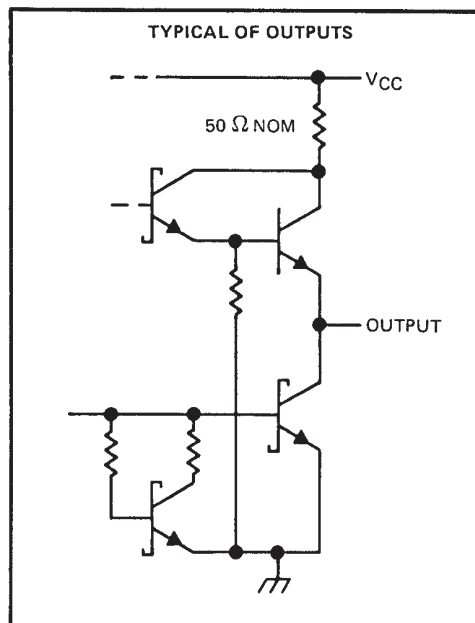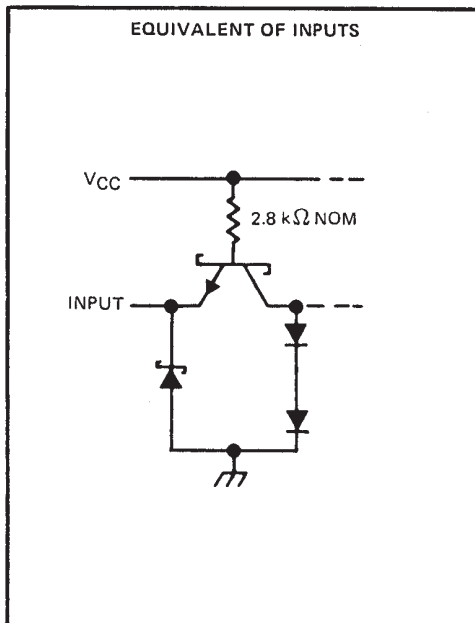
## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage (see Note 1) . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 7 V
Input voltage: 'LS280 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 7 V
               'S280 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 5.5 V
Operating free-air temperature range: SN54' . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . −55°C to 125°C
                          SN74' . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 0°C to 70°C
Storage temperature range . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . −65°C to 150°C

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

TEXAS
INSTRUMENTS

## recommended operating conditions

| | | SN54LS280 | | | SN74LS280 | | | UNIT |
|---|---|---|---|---|---|---|---|---|
| | | MIN | NOM | MAX | MIN | NOM | MAX | |
| $V_{CC}$ | Supply voltage | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | V |
| $V_{IH}$ | High-level input voltage | 2 | | | 2 | | | V |
| $V_{IL}$ | Low-level input voltage | | | 0.7 | | | 0.8 | V |
| $I_{OH}$ | High-level output current | | | − 0.4 | | | − 0.4 | mA |
| $I_{OL}$ | Low-level output current | | | 4 | | | 8 | mA |
| $T_A$ | Operating free-air temperature | − 55 | | 125 | 0 | | 70 | °C |

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

| PARAMETER | TEST CONDITIONS | | | SN54LS280 | | | SN74LS280 | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | MIN | TYP‡ | MAX | MIN | TYP‡ | MAX | |
| $V_{IK}$ | $V_{CC}$ = MIN, | $I_I$ = − 18 mA | | | | − 1.5 | | | − 1.5 | V |
| $V_{OH}$ | $V_{CC}$ = MIN, $V_{IH}$ = 2 V, $V_{IL}$ = MAX, $I_{OH}$ = − 0.4 mA | | | 2.5 | 3.4 | | 2.7 | 3.4 | | V |
| $V_{OL}$ | $V_{CC}$ = MIN, $V_{IH}$ = 2 V, $V_{IL}$ = MAX | $I_{OL}$ = 4 mA | | 0.25 | 0.4 | | | 0.25 | 0.4 | V |
| | | $I_{OL}$ = 8 mA | | | | | | 0.35 | 0.5 | |
| $I_I$ | $V_{CC}$ = MAX, | $V_I$ = 7 V | | | | 0.1 | | | 0.1 | mA |
| $I_{IH}$ | $V_{CC}$ = MAX, | $V_I$ = 2.7 V | | | | 20 | | | 20 | μA |
| $I_{IL}$ | $V_{CC}$ = MAX, | $V_I$ = 0.4 V | | | | − 0.4 | | | − 0.4 | mA |
| $I_{OS}$§ | $V_{CC}$ = MAX | | | − 20 | | − 100 | − 20 | | − 100 | mA |
| $I_{CC}$ | $V_{CC}$ = MAX, | See Note 2 | | | 16 | 27 | | 16 | 27 | mA |

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at $V_{CC}$ = 5 V, $T_A$ = 25°C.
§ Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.
NOTE 2: $I_{CC}$ is measured with all inputs grounded and all outputs open.

## switching characteristics, $V_{CC}$ = 5 V, $T_A$ = 25°C

| PARAMETER¶ | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| $t_{PLH}$ | Data | Σ Even | $C_L$ = 15 pF, $R_L$ = 2 kΩ, Inputs not under test at 0 V, See Note 3 | | 33 | 50 | ns |
| $t_{PHL}$ | | | | | 29 | 45 | |
| $t_{PLH}$ | Data | Σ Odd | | | 23 | 35 | ns |
| $t_{PHL}$ | | | | | 31 | 50 | |

¶ $t_{PLH}$ ≡ propagation delay time, low-to-high-level output; $t_{PHL}$ ≡ propagation delay time, high-to-low-level output
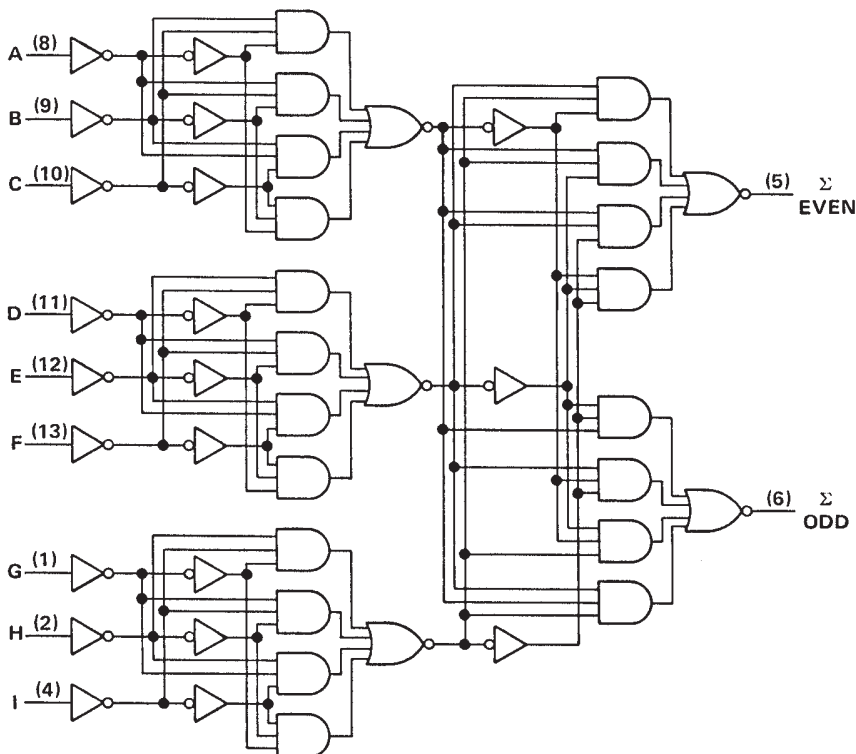NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

## recommended operating conditions

| | SN54S280 MIN | SN54S280 NOM | SN54S280 MAX | SN74S280 MIN | SN74S280 NOM | SN74S280 MAX | UNIT |
|---|---|---|---|---|---|---|---|
| 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[†] | | MIN | TYP[‡] | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| $V_{IH}$ | High-level input voltage | | | 2 | | | V |
| $V_{IL}$ | Low-level input voltage | | | | | 0.8 | V |
| $V_{IK}$ | Input clamp voltage | $V_{CC}$ = MIN, $I_I$ = −18 mA | | | | −1.2 | V |
| $V_{OH}$ | High-level output voltage | $V_{CC}$ = MIN, $V_{IH}$ = 2 V, $V_{IL}$ = 0.8 V, $I_{OH}$ = −1 mA | SN54S' | 2.5 | 3.4 | | V |
| | | | SN74S' | 2.7 | 3.4 | | |
| $V_{OL}$ | Low-level output voltage | $V_{CC}$ = MIN, $V_{IH}$ = 2 V, $V_{IL}$ = 0.8 V, $I_{OL}$ = 20 mA | | | | 0.5 | V |
| $I_I$ | Input current at maximum input voltage | $V_{CC}$ = MAX, $V_I$ = 5.5 V | | | | 1 | mA |
| $I_{IH}$ | High-level input current | $V_{CC}$ = MAX, $V_I$ = 2.7 V | | | | 50 | µA |
| $I_{IL}$ | Low-level input current | $V_{CC}$ = MAX, $V_I$ = 0.5 V | | | | −2 | mA |
| $I_{OS}$ | Short-circuit output current[§] | $V_{CC}$ = MAX | | −40 | | −100 | mA |
| $I_{CC}$ | Supply current | $V_{CC}$ = MAX, See Note 2 | SN54S280 | | 67 | 99 | mA |
| | | | SN74S280 | | 67 | 105 | |
| | | $V_{CC}$ = MAX, $T_A$ = 125°C, See Note 2 | SN54S280N | | | 94 | mA |

[†] For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
[‡] All typical values are at $V_{CC}$ = 5 V, $T_A$ = 25°C.
[§] Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.
NOTE 2: $I_{CC}$ is measured with all inputs grounded and all outputs open.

## switching characteristics, $V_{CC}$ = 5 V, $T_A$ = 25°C

| PARAMETER[¶] | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| $t_{PLH}$ | Data | Σ Even | $C_L$ = 15 pF, $R_L$ = 280 Ω, See Note 3 | | 14 | 21 | ns |
| $t_{PHL}$ | | | | | 11.5 | 18 | |
| $t_{PLH}$ | Data | Σ Odd | | | 14 | 21 | ns |
| $t_{PHL}$ | | | | | 11.5 | 18 | |

[¶] $t_{PLH}$ = 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.

TEXAS
INSTRUMENTS
POST OFFICE BOX 655303 ● DALLAS, TEXAS 75265
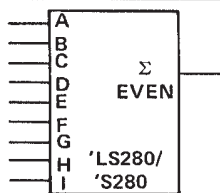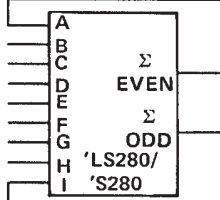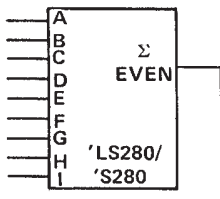
**logic diagram (positive logic)**



Pin numbers shown are for D, J, N, and W packages.

## TYPICAL APPLICATION DATA
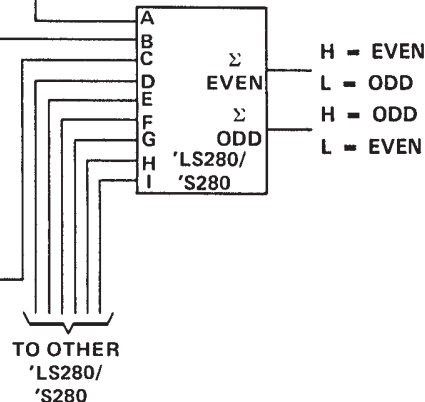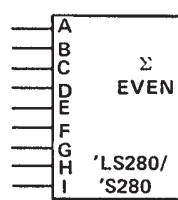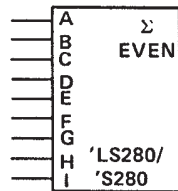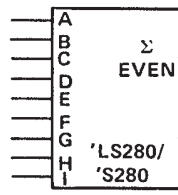
### 25-LINE PARITY/GENERATOR CHECKER

Three 'LS280's or 'S280's can be used to implement a 25-line parity generator/checker. This arrangement will provide parity in typically 75 or 25 nanoseconds respectively.



H = EVEN
L = ODD
H = ODD
L = EVEN

As an alternative, the outputs of two or three parity generators/checkers can be decoded with a 2-input ('S86 or 'LS86) or 3-input ('S135) exclusive-OR gate for 18- or 27-line parity applications.

### 81-LINE PARITY/GENERATOR CHECKER

Longer word lengths can be implemented by cascading 'LS280's or 'S280's. As shown here, parity can be generated for word lengths up to 81 bits in typically 75 or 25 nanoseconds respectively.



H = EVEN
L = ODD
H = ODD
L = EVEN

TO OTHER
'LS280/
'S280



TEXAS
INSTRUMENTS

POST OFFICE BOX 655303 ● DALLAS, TEXAS 75265

## PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish | MSL Peak Temp (3) | Op Temp (°C) | Top-Side Markings (4) | Samples |
|---|---|---|---|---|---|---|---|---|---|---|---|
| JM38510/32901B2A | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | JM38510/ 32901B2A | Samples |
| JM38510/32901BCA | ACTIVE | CDIP | J | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | JM38510/ 32901BCA | Samples |
| JM38510/32901BCA | ACTIVE | CDIP | J | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | JM38510/ 32901BCA | Samples |
| JM38510/32901BDA | ACTIVE | CFP | W | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | JM38510/ 32901BDA | Samples |
| JM38510/32901BDA | ACTIVE | CFP | W | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | JM38510/ 32901BDA | Samples |
| M38510/32901B2A | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | JM38510/ 32901B2A | Samples |
| M38510/32901B2A | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | JM38510/ 32901B2A | Samples |
| M38510/32901BCA | ACTIVE | CDIP | J | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | JM38510/ 32901BCA | Samples |
| M38510/32901BCA | ACTIVE | CDIP | J | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | JM38510/ 32901BCA | Samples |
| M38510/32901BDA | ACTIVE | CFP | W | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | JM38510/ 32901BDA | Samples |
| M38510/32901BDA | ACTIVE | CFP | W | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | JM38510/ 32901BDA | Samples |
| SN54LS280J | ACTIVE | CDIP | J | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | SN54LS280J | Samples |
| SN54LS280J | ACTIVE | CDIP | J | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | SN54LS280J | Samples |
| SN54S280J | ACTIVE | CDIP | J | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | SN54S280J | Samples |
| SN54S280J | ACTIVE | CDIP | J | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | SN54S280J | Samples |
| SN74LS280D | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS280 | Samples |
| SN74LS280D | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS280 | Samples |
| SN74LS280DE4 | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS280 | Samples |

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish | MSL Peak Temp (3) | Op Temp (°C) | Top-Side Markings (4) | Samples |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SN74LS280DE4 | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS280 | Samples |
| SN74LS280DG4 | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS280 | Samples |
| SN74LS280DG4 | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS280 | Samples |
| SN74LS280J | OBSOLETE | CDIP | J | 14 | | TBD | Call TI | Call TI | 0 to 70 | | |
| SN74LS280J | OBSOLETE | CDIP | J | 14 | | TBD | Call TI | Call TI | 0 to 70 | | |
| SN74LS280N | ACTIVE | PDIP | N | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | 0 to 70 | SN74LS280N | Samples |
| SN74LS280N | ACTIVE | PDIP | N | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | 0 to 70 | SN74LS280N | Samples |
| SN74LS280N3 | OBSOLETE | PDIP | N | 14 | | TBD | Call TI | Call TI | 0 to 70 | | |
| SN74LS280N3 | OBSOLETE | PDIP | N | 14 | | TBD | Call TI | Call TI | 0 to 70 | | |
| SN74LS280NE4 | ACTIVE | PDIP | N | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | 0 to 70 | SN74LS280N | Samples |
| SN74LS280NE4 | ACTIVE | PDIP | N | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | 0 to 70 | SN74LS280N | Samples |
| SN74LS280NSR | ACTIVE | SO | NS | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 74LS280 | Samples |
| SN74LS280NSR | ACTIVE | SO | NS | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 74LS280 | Samples |
| SN74LS280NSRE4 | ACTIVE | SO | NS | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 74LS280 | Samples |
| SN74LS280NSRE4 | ACTIVE | SO | NS | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 74LS280 | Samples |
| SN74LS280NSRG4 | ACTIVE | SO | NS | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 74LS280 | Samples |
| SN74LS280NSRG4 | ACTIVE | SO | NS | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 74LS280 | Samples |
| SN74S280D | OBSOLETE | SOIC | D | 14 | | TBD | Call TI | Call TI | 0 to 70 | | |
| SN74S280D | OBSOLETE | SOIC | D | 14 | | TBD | Call TI | Call TI | 0 to 70 | | |
| SN74S280N | NRND | PDIP | N | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | 0 to 70 | SN74S280N | |

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish | MSL Peak Temp (3) | Op Temp (°C) | Top-Side Markings (4) | Samples |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SN74S280N | NRND | PDIP | N | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | 0 to 70 | SN74S280N | |
| SN74S280N3 | OBSOLETE | PDIP | N | 14 | | TBD | Call TI | Call TI | 0 to 70 | | |
| SN74S280N3 | OBSOLETE | PDIP | N | 14 | | TBD | Call TI | Call TI | 0 to 70 | | |
| SN74S280NE4 | NRND | PDIP | N | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | 0 to 70 | SN74S280N | |
| SN74S280NE4 | NRND | PDIP | N | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | 0 to 70 | SN74S280N | |
| SNJ54LS280FK | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | SNJ54LS 280FK | Samples |
| SNJ54LS280FK | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | SNJ54LS 280FK | Samples |
| SNJ54LS280J | ACTIVE | CDIP | J | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | SNJ54LS280J | Samples |
| SNJ54LS280J | ACTIVE | CDIP | J | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | SNJ54LS280J | Samples |
| SNJ54LS280W | ACTIVE | CFP | W | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | SNJ54LS280W | Samples |
| SNJ54LS280W | ACTIVE | CFP | W | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | SNJ54LS280W | Samples |
| SNJ54S280FK | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | SNJ54S 280FK | Samples |
| SNJ54S280FK | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | SNJ54S 280FK | Samples |
| SNJ54S280J | ACTIVE | CDIP | J | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | SNJ54S280J | Samples |
| SNJ54S280J | ACTIVE | CDIP | J | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | SNJ54S280J | Samples |
| SNJ54S280W | ACTIVE | CFP | W | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | SNJ54S280W | Samples |
| SNJ54S280W | ACTIVE | CFP | W | 14 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | SNJ54S280W | Samples |

**(1)** The marketing status values are defined as follows:
**ACTIVE:** Product device recommended for new designs.
**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.
**OBSOLETE:** TI has discontinued the production of the device.

**(2)** Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), 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)

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

**(4)** Multiple Top-Side Markings will be inside parentheses. Only one Top-Side 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 Top-Side 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 SN54LS280, SN54S280, SN74LS280, SN74S280 :**

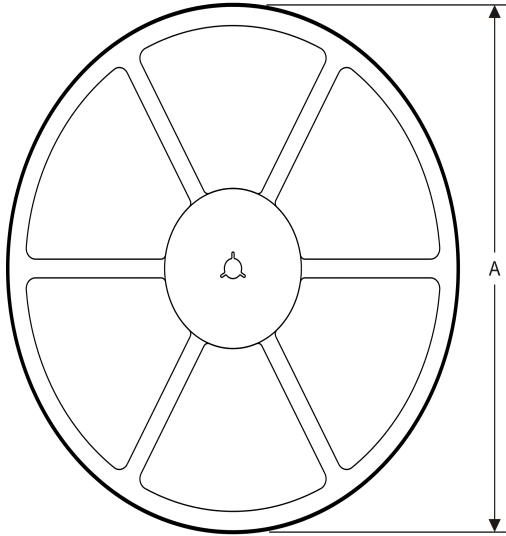● Catalog: SN74LS280, SN74S280

● Military: SN54LS280, SN54S280

NOTE: Qualified Version Definitions:

    ● Catalog - TI's standard catalog product

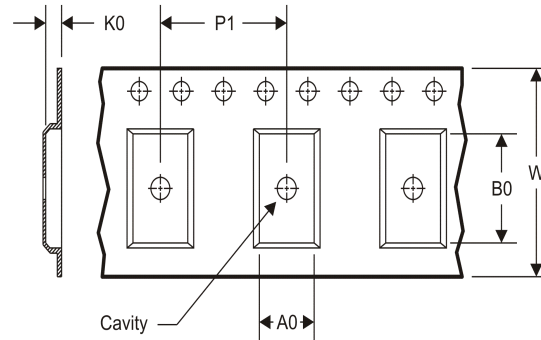    ● Military - QML certified for Military and Defense Applications

# PACKAGE MATERIALS INFORMATION

## TAPE AND REEL INFORMATION

**REEL DIMENSIONS**
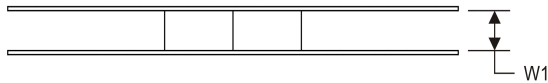
**TAPE DIMENSIONS**

| | |
|---|---|
| A0 | Dimension designed to accommodate the component width |
| B0 | Dimension designed to accommodate the component length |
| K0 | Dimension designed to accommodate the component thickness |
| W | Overall width of the carrier tape |
| P1 | Pitch between successive cavity centers |

**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SN74LS280NSR | SO | NS | 14 | 2000 | 330.0 | 16.4 | 8.2 | 10.5 | 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) |
|--------|-------------|-----------------|------|-----|-------------|------------|-------------|
| SN74LS280NSR | SO | NS | 14 | 2000 | 367.0 | 367.0 | 38.0 |

J (R—GDIP—T**)
14 LEADS SHOWN

CERAMIC DUAL IN—LINE PACKAGE

| DIM \ PINS ** | 14 | 16 | 18 | 20 |
|---|---|---|---|---|
| [A] | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC |
| B MAX | 0.785 (19,94) | .840 (21,34) | 0.960 (24,38) | 1.060 (26,92) |
| B MIN | —— | —— | —— | —— |
| C MAX | 0.300 (7,62) | 0.300 (7,62) | 0.310 (7,87) | 0.300 (7,62) |
| C MIN | 0.245 (6,22) | 0.245 (6,22) | 0.220 (5,59) | 0.245 (6,22) |

B

14          8

C

1          7

$\dfrac{0.065\ (1,65)}{0.045\ (1,14)}$

0.005 (0,13) MIN

$\dfrac{0.060\ (1,52)}{0.015\ (0,38)}$

0.200 (5,08) MAX

Seating Plane

0.130 (3,30) MIN

$\dfrac{0.026\ (0,66)}{0.014\ (0,36)}$

0.100 (2,54)

[A]

0°—15°

$\dfrac{0.014\ (0,36)}{0.008\ (0,20)}$

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.

W (R–GDFP–F14)                                     CERAMIC DUAL FLATPACK

Base and Seating Plane

$\dfrac{0.045\ (1,14)}{0.026\ (0,66)}$

$\dfrac{0.260\ (6,60)}{0.235\ (5,97)}$

$\dfrac{0.006\ (0,15)}{0.004\ (0,10)}$

$\dfrac{0.080\ (2,03)}{0.045\ (1,14)}$

0.280 (7,11) MAX

1                    14

$\dfrac{0.019\ (0,48)}{0.015\ (0,38)}$

0.050 (1,27)

$\dfrac{0.390\ (9,91)}{0.335\ (8,51)}$

0.005 (0,13) MIN
4 Places

7                    8

$\dfrac{0.360\ (9,14)}{0.250\ (6,35)}$          $\dfrac{0.360\ (9,14)}{0.250\ (6,35)}$
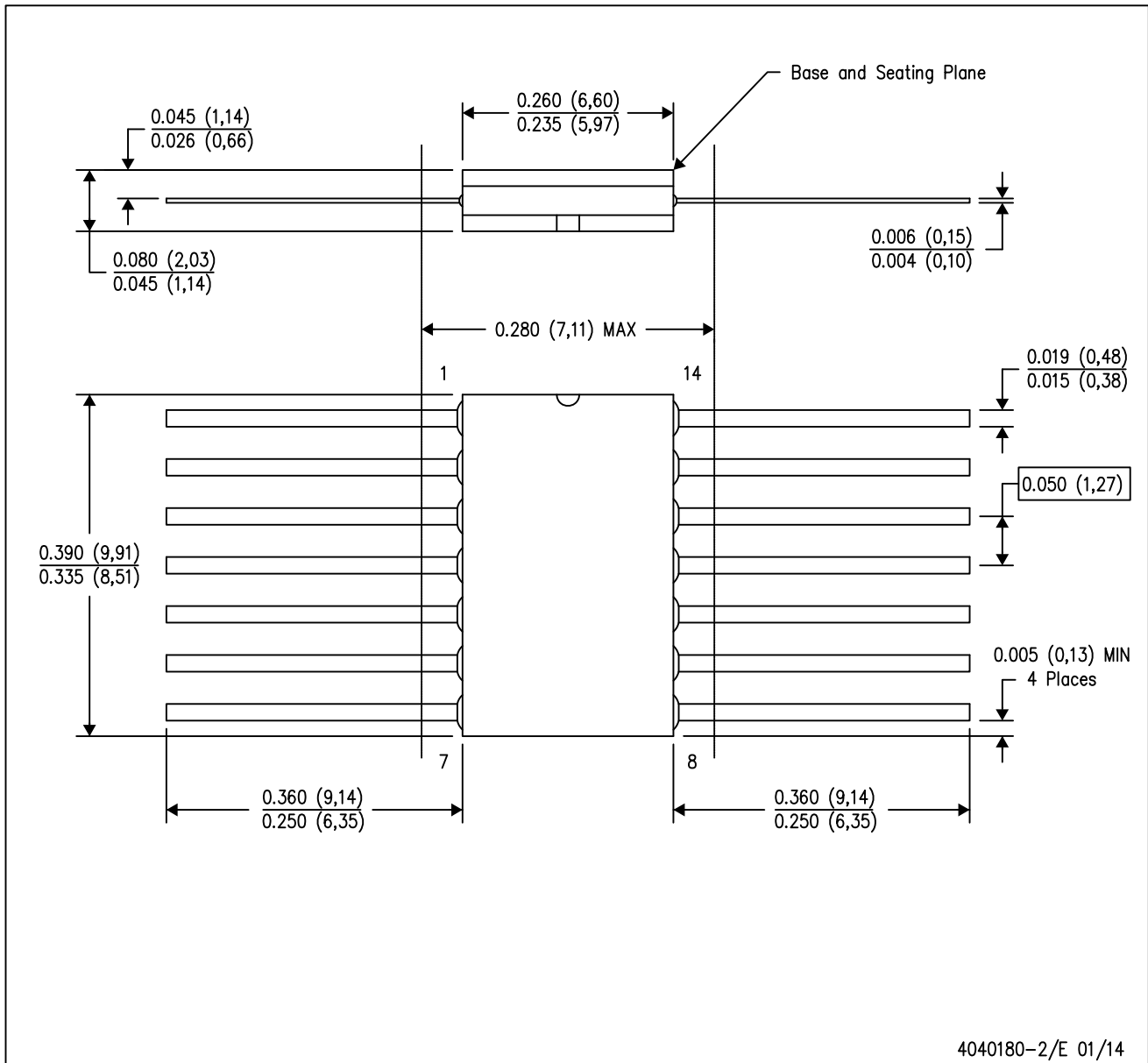
4040180–2/E 01/14

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 and JEDEC MO–092AB

FK (S−CQCC−N**)                    LEADLESS  CERAMIC  CHIP  CARRIER
28 TERMINAL SHOWN

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

$\frac{0.020\ (0,51)}{0.010\ (0,25)}$

$\frac{0.020\ (0,51)}{0.010\ (0,25)}$

$\frac{0.080\ (2,03)}{0.064\ (1,63)}$

$\frac{0.055\ (1,40)}{0.045\ (1,14)}$

$\frac{0.045\ (1,14)}{0.035\ (0,89)}$

$\frac{0.028\ (0,71)}{0.022\ (0,54)}$    0.050 (1,27)    $\frac{0.045\ (1,14)}{0.035\ (0,89)}$

4040140/D 01/11

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.   Falls within JEDEC MS−004

## N (R−PDIP−T**)                    PLASTIC DUAL−IN−LINE PACKAGE

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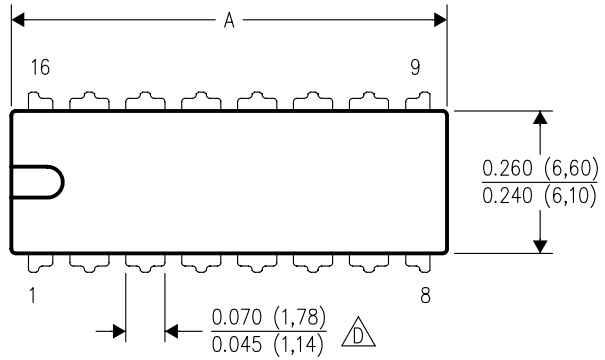
| DIM \ PINS ** | 14 | 16 | 18 | 20 |
|---|---|---|---|---|
| A   MAX | 0.775 (19,69) | 0.775 (19,69) | 0.920 (23,37) | 1.060 (26,92) |
| A   MIN | 0.745 (18,92) | 0.745 (18,92) | 0.850 (21,59) | 0.940 (23,88) |
| MS−001 VARIATION ⚠C | AA | BB | AC | AD |

0.260 (6,60) / 0.240 (6,10)

0.070 (1,78) / 0.045 (1,14) ⚠D

0.045 (1,14) / 0.030 (0,76) ⚠D

0.020 (0,51) MIN

0.200 (5,08) MAX

Seating Plane

0.125 (3,18) MIN

0.100 (2,54)

0.021 (0,53) / 0.015 (0,38)

⊕ 0.010 (0,25) Ⓜ
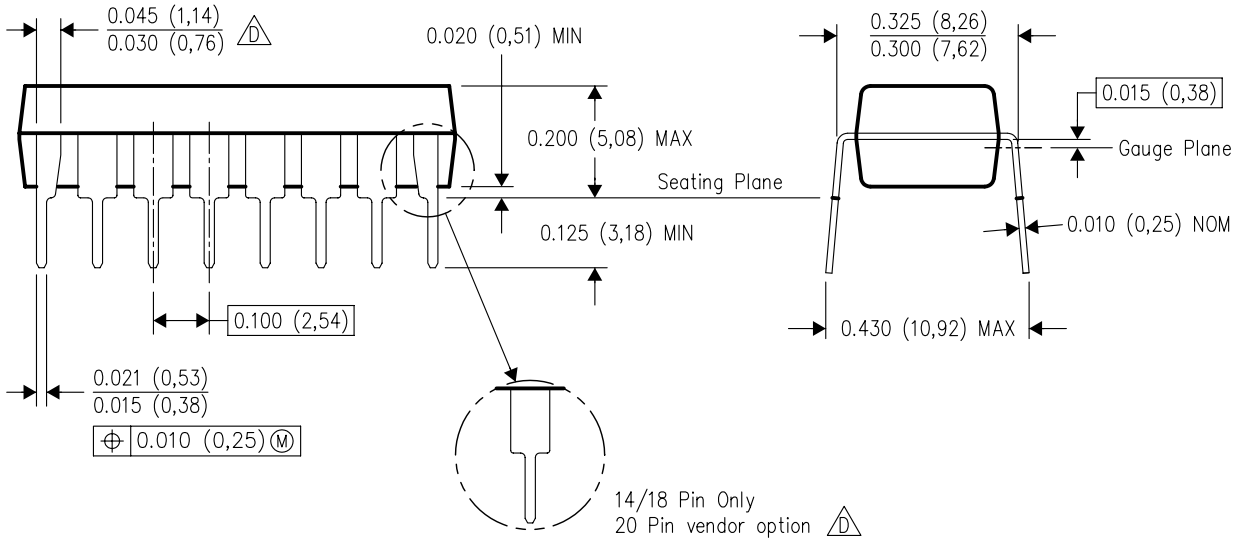
14/18 Pin Only
20 Pin vendor option ⚠D

0.325 (8,26) / 0.300 (7,62)

0.015 (0,38)

Gauge Plane

0.010 (0,25) NOM

0.430 (10,92) MAX

4040049/E   12/2002

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

D (R−PDSO−G14)              PLASTIC SMALL OUTLINE



4040047−5/M   06/11

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.

**TEXAS INSTRUMENTS**
www.ti.com

D (R−PDSO−G14)                    PLASTIC SMALL OUTLINE

Example Board Layout
(Note C)

Stencil Openings
(Note D)

12x1,27

14x0,55

14x1,50

12x1,27

5,40

5,40

Example
Non Soldermask Defined Pad

Example
Pad Geometry
(See Note C)

0,60

1,55

Example
Solder Mask Opening
(See Note E)

0.07
All Around

4211283−3/E   08/12

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.

**NS (R-PDSO-G**)**                                    PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



0,15 NOM

Gage Plane

0°–10°

0,25

1,05
0,55

1,27

0,51
0,35

⌖ 0,25 Ⓜ

14                    8

5,60    8,20
5,00    7,40

1                     7

A

0,15
0,05

2,00 MAX

Seating Plane

◿ 0,10

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

4040062/C 03/03

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

# IMPORTANT NOTICE