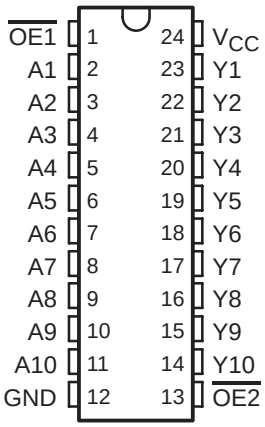
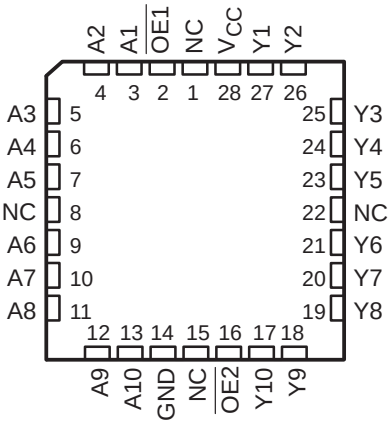
- **State-of-the-Art *EPIC*-IIB™ BiCMOS Design Significantly Reduces Power Dissipation**
- **Flow-Through Architecture Optimizes PCB Layout**
- **Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17**
- **Typical $V_{OLP}$ (Output Ground Bounce) < 1 V at $V_{CC}$ = 5 V, $T_A$ = 25°C**
- **High-Impedance State During Power Up and Power Down**
- **High-Drive Outputs (−32-mA $I_{OH}$, 64-mA $I_{OL}$)**
- **Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB), and Thin Shrink Small-Outline (PW) Packages, Ceramic Chip Carriers (FK), and Plastic (NT) and Ceramic (JT) DIPs**

**SN54ABT827 . . . JT PACKAGE**
**SN74ABT827 . . . DB, DW, NT, OR PW PACKAGE**
**(TOP VIEW)**




**SN54ABT827 . . . FK PACKAGE**
**(TOP VIEW)**




NC − No internal connection

## description

These 10-bit buffers or bus drivers provide a high-performance bus interface for wide data paths or buses carrying parity.

The 3-state control gate is a 2-input AND gate with active-low inputs so that, if either output-enable ($\overline{OE1}$ or $\overline{OE2}$) input is high, all ten outputs are in the high-impedance state. The ’ABT827 provides true data at the outputs.

When $V_{CC}$ is between 0 and 2.1 V, the device is in the high-impedance state during power up or power down. However, to ensure the high-impedance state above 2.1 V, $\overline{OE}$ should be tied to $V_{CC}$ through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

The SN54ABT827 is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74ABT827 is characterized for operation from −40°C to 85°C.

**FUNCTION TABLE**

| INPUTS | | | OUTPUT |
|---|---|---|---|
| $\overline{OE1}$ | $\overline{OE2}$ | A | Y |
| L | L | L | L |
| L | L | H | H |
| H | X | X | Z |
| X | H | X | Z |

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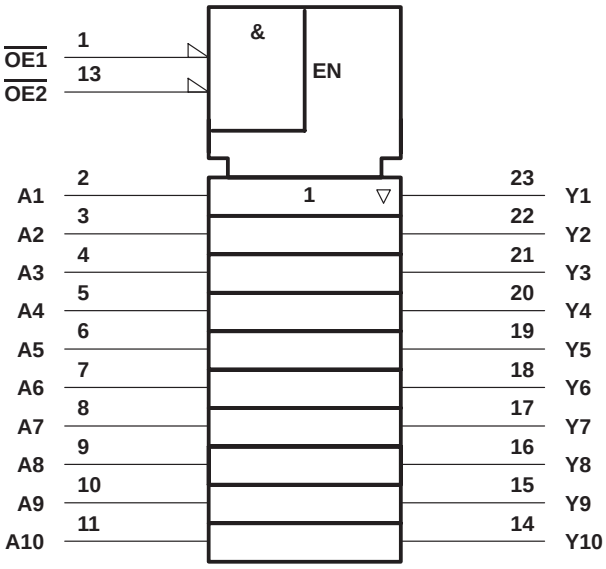
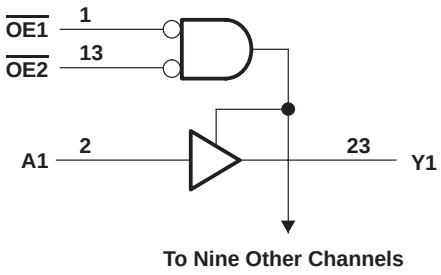
### logic symbol†




### logic diagram (positive logic)




† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for the DB, DW, JT, NT, and PW packages.

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

| | |
|---|---|
| Supply voltage range, $V_{CC}$ | −0.5 V to 7 V |
| Input voltage range, $V_I$ (see Note 1) | −0.5 V to 7 V |
| Voltage range applied to any output in the high or power-off state, $V_O$ | −0.5 V to 5.5 V |
| Current into any output in the low state, $I_O$: SN54ABT827 | 96 mA |
| SN74ABT827 | 128 mA |
| Input clamp current, $I_{IK}$ ($V_I$ < 0) | −18 mA |
| Output clamp current, $I_{OK}$ ($V_O$ < 0) | −50 mA |
| Package thermal impedance, $\theta_{JA}$ (see Note 2): DB package | 104°C/W |
| DW package | 81°C/W |
| NT package | 67°C/W |
| PW package | 120°C/W |
| Storage temperature range, $T_{stg}$ | −65°C to 150°C |

‡ 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 negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
2. The package thermal impedance is calculated in accordance with EIA/JEDEC Std JESD51, except for through-hole packages, which use a trace length of zero.

## recommended operating conditions (see Note 3)

| | | SN54ABT827 | | SN74ABT827 | | UNIT |
|---|---|---|---|---|---|---|
| | | MIN | MAX | MIN | MAX | |
| $V_{CC}$ | Supply voltage | 4.5 | 5.5 | 4.5 | 5.5 | V |
| $V_{IH}$ | High-level input voltage | 2 | | 2 | | V |
| $V_{IL}$ | Low-level input voltage | | 0.8 | | 0.8 | V |
| $V_I$ | Input voltage | 0 | $V_{CC}$ | 0 | $V_{CC}$ | V |
| $I_{OH}$ | High-level output current | | −24 | | −32 | mA |
| $I_{OL}$ | Low-level output current | | 48 | | 64 | mA |
| $\Delta t/\Delta v$ | Input transition rise or fall rate | | 5 | | 5 | ns/V |
| $\Delta t/\Delta V_{CC}$ | Power-up ramp rate | 200 | | 200 | | μs/V |
| $T_A$ | Operating free-air temperature | −55 | 125 | −40 | 85 | °C |

NOTE 3: Unused inputs must be held high or low to prevent them from floating.

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

| PARAMETER | TEST CONDITIONS | | $T_A$ = 25°C | | | SN54ABT827 | | SN74ABT827 | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | MIN | TYP† | MAX | MIN | MAX | MIN | MAX | |
| $V_{IK}$ | $V_{CC}$ = 4.5 V, | $I_I$ = −18 mA | | | −1.2 | | −1.2 | | −1.2 | V |
| $V_{OH}$ | $V_{CC}$ = 4.5 V, | $I_{OH}$ = −3 mA | 2.5 | | | 2.5 | | 2.5 | | V |
| | $V_{CC}$ = 5 V, | $I_{OH}$ = −3 mA | 3 | | | 3 | | 3 | | |
| | $V_{CC}$ = 4.5 V | $I_{OH}$ = −24 mA | 2 | | | 2 | | | | |
| | | $I_{OH}$ = −32 mA | 2* | | | | | 2 | | |
| $V_{OL}$ | $V_{CC}$ = 4.5 V | $I_{OL}$ = 48 mA | | | 0.55 | | 0.55 | | | V |
| | | $I_{OL}$ = 64 mA | | | 0.55* | | | | 0.55 | |
| $V_{hys}$ | | | | 100 | | | | | | mV |
| $I_I$ | $V_{CC}$ = 0 to 5.5 V, | $V_I$ = $V_{CC}$ or GND | | | ±1 | | ±1 | | ±1 | µA |
| $I_{OZPU}$‡ | $V_{CC}$ = 0 to 2.1 V, $V_O$ = 0.5 V to 2.7 V, $\overline{OE}$ = X | | | | ±50 | | ±10 | | ±50 | µA |
| $I_{OZPD}$‡ | $V_{CC}$ = 2.1 V to 0, $V_O$ = 0.5 V to 2.7 V, $\overline{OE}$ = X | | | | ±50 | | ±10 | | ±50 | µA |
| $I_{OZH}$ | $V_{CC}$ = 2.1 V to 5.5 V, $V_O$ = 2.7 V, $\overline{OE}$ ≥ 2 V | | | | 10§ | | 10 | | 10§ | µA |
| $I_{OZL}$ | $V_{CC}$ = 2.1 V to 5.5 V, $V_O$ = 0.5 V, $\overline{OE}$ ≥ 2 V | | | | −10§ | | −10 | | −10§ | µA |
| $I_{off}$ | $V_{CC}$ = 0, | $V_I$ or $V_O$ ≤ 5.5 V | | | ±100 | | | | ±100 | µA |
| $I_{CEX}$ | $V_{CC}$ = 5.5 V, $V_O$ = 5.5 V | Outputs high | | | 50 | | 50 | | 50 | µA |
| $I_O$¶ | $V_{CC}$ = 5.5 V, | $V_O$ = 2.5 V | −50 | −140 | −225§ | −50 | −225§ | −50 | −225§ | mA |
| $I_{CC}$ | $V_{CC}$ = 5.5 V, $I_O$ = 0, $V_I$ = $V_{CC}$ or GND | Outputs high | | 80 | 250 | | 250 | | 250 | µA |
| | | Outputs low | | 35 | 40§ | | 40§ | | 40§ | mA |
| | | Outputs disabled | | 80 | 250 | | 250 | | 250 | µA |
| $\Delta I_{CC}$# | $V_{CC}$ = 5.5 V, One input at 3.4 V, Other inputs at $V_{CC}$ or GND | Outputs enabled | | | 1.5 | | 1.5 | | 1.5 | mA |
| | | Outputs disabled | | | 50 | | 50 | | 50 | µA |
| | | Control inputs | | | 1.5 | | 1.5 | | 1.5 | mA |
| $C_i$ | $V_I$ = 2.5 V or 0.5 V | | | 4 | | | | | | pF |
| $C_o$ | $V_O$ = 2.5 V or 0.5 V | | | 8 | | | | | | pF |

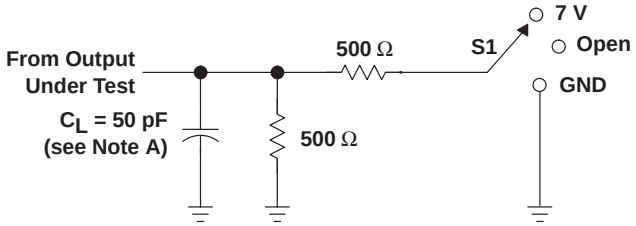
* On products compliant to MIL-PRF-38535, this parameter does not apply.
† All typical values are at $V_{CC}$ = 5 V.
‡ This parameter is characterized, but not production tested.
§ This data sheet limit may vary among suppliers.
¶ Not more than one output should be tested at a time, and the duration of the test should not exceed one second.
# This is the increase in supply current for each input that is at the specified TTL voltage level, rather than $V_{CC}$ or GND.

## switching characteristics over recommended ranges of supply voltage and operating free-air temperature, $C_L$ = 50 pF (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC}$ = 5 V, $T_A$ = 25°C | | | SN54ABT827 | | SN74ABT827 | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| $t_{PLH}$ | A | Y | 1.1 | 2.6 | 4.4 | 1.1 | 4.9 | 1.1 | 4.8 | ns |
| $t_{PHL}$ | | | 1.1 | 2.3 | 4.1 | 1.1 | 4.8 | 1.1 | 4.7 | |
| $t_{PZH}$ | $\overline{OE}$ | Y | 1§ | 3.2 | 5.1 | 1 | 6 | 1§ | 5.9 | ns |
| $t_{PZL}$ | | | 1§ | 3.3 | 5.9 | 1 | 7.1 | 1§ | 6.9 | |
| $t_{PHZ}$ | $\overline{OE}$ | Y | 2 | 4.9 | 6.3 | 2 | 7 | 2 | 6.8 | ns |
| $t_{PLZ}$ | | | 1.3§ | 4.2 | 6.6 | 1.3 | 7.9 | 1.3§ | 6.9 | |

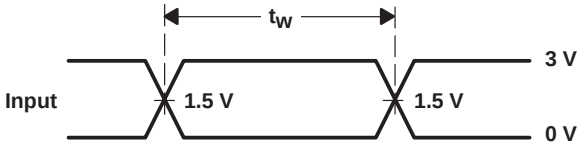
§ This data sheet limit may vary among suppliers.

## PARAMETER MEASUREMENT INFORMATION

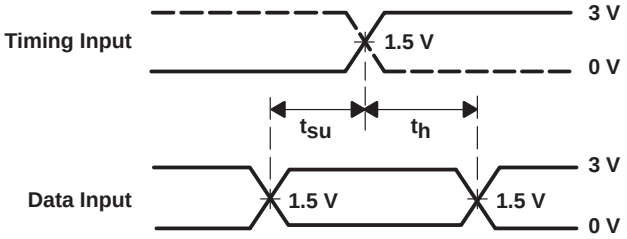



| TEST | S1 |
|---|---|
| $t_{PLH}/t_{PHL}$ | Open |
| $t_{PLZ}/t_{PZL}$ | 7 V |
| $t_{PHZ}/t_{PZH}$ | Open |

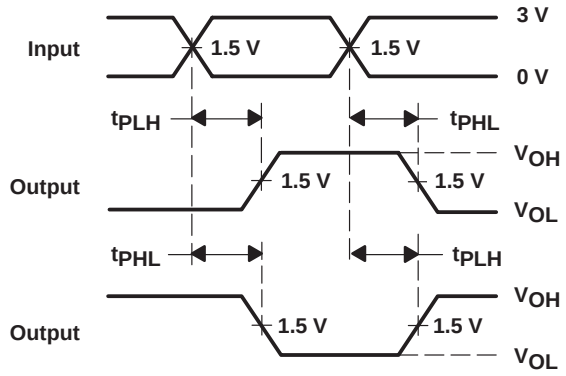
LOAD CIRCUIT



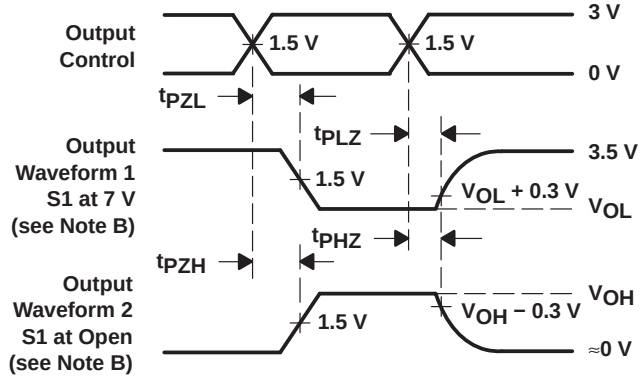

VOLTAGE WAVEFORMS
PULSE DURATION




VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES




VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS




VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES
LOW- AND HIGH-LEVEL ENABLING

NOTES: A. $C_L$ includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, $Z_O$ = 50 Ω, $t_r$ ≤ 2.5 ns, $t_f$ ≤ 2.5 ns.
D. The outputs are measured one at a time, with one transition per measurement.

**Figure 1. Load Circuit and Voltage Waveforms**

## PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5962-9450901QKA | ACTIVE | CFP | W | 24 | 1 | TBD | Call TI | N / A for Pkg Type | -55 to 125 | 5962-9450901QKA SNJ54ABT827W | Samples |
| 5962-9450901QLA | ACTIVE | CDIP | JT | 24 | 1 | TBD | Call TI | N / A for Pkg Type | -55 to 125 | 5962-9450901QLA SNJ54ABT827JT | Samples |
| SN74ABT827DBR | ACTIVE | SSOP | DB | 24 | 2000 | Green (RoHS & no Sb/Br) | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | AB827 | Samples |
| SN74ABT827DW | ACTIVE | SOIC | DW | 24 | 25 | Green (RoHS & no Sb/Br) | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | ABT827 | Samples |
| SN74ABT827DWR | ACTIVE | SOIC | DW | 24 | 2000 | Green (RoHS & no Sb/Br) | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | ABT827 | Samples |
| SN74ABT827PW | ACTIVE | TSSOP | PW | 24 | 60 | Green (RoHS & no Sb/Br) | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | AB827 | Samples |
| SN74ABT827PWG4 | ACTIVE | TSSOP | PW | 24 | 60 | Green (RoHS & no Sb/Br) | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | AB827 | Samples |
| SN74ABT827PWR | ACTIVE | TSSOP | PW | 24 | 2000 | Green (RoHS & no Sb/Br) | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | AB827 | Samples |
| SNJ54ABT827JT | ACTIVE | CDIP | JT | 24 | 1 | TBD | Call TI | N / A for Pkg Type | -55 to 125 | 5962-9450901QLA SNJ54ABT827JT | Samples |
| SNJ54ABT827W | ACTIVE | CFP | W | 24 | 1 | TBD | Call TI | N / A for Pkg Type | -55 to 125 | 5962-9450901QKA SNJ54ABT827W | 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) **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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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 SN54ABT827, SN74ABT827 :**

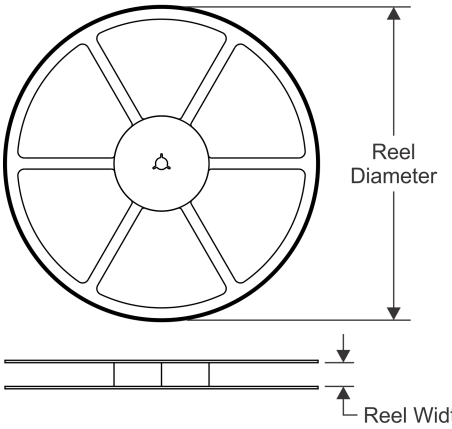
- Catalog: SN74ABT827
- Military: SN54ABT827

NOTE: Qualified Version Definitions:

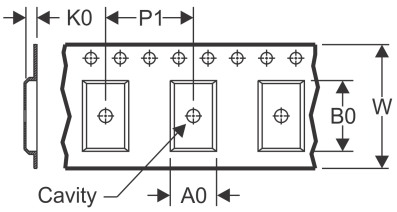
- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

## TAPE AND REEL INFORMATION

**REEL DIMENSIONS**

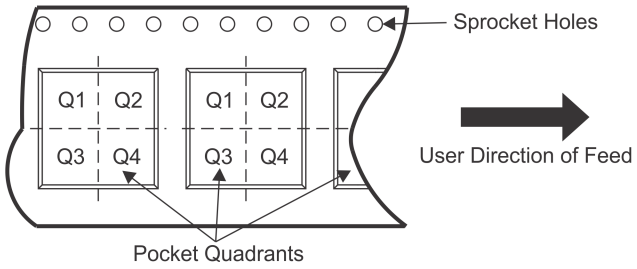



**TAPE DIMENSIONS**




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

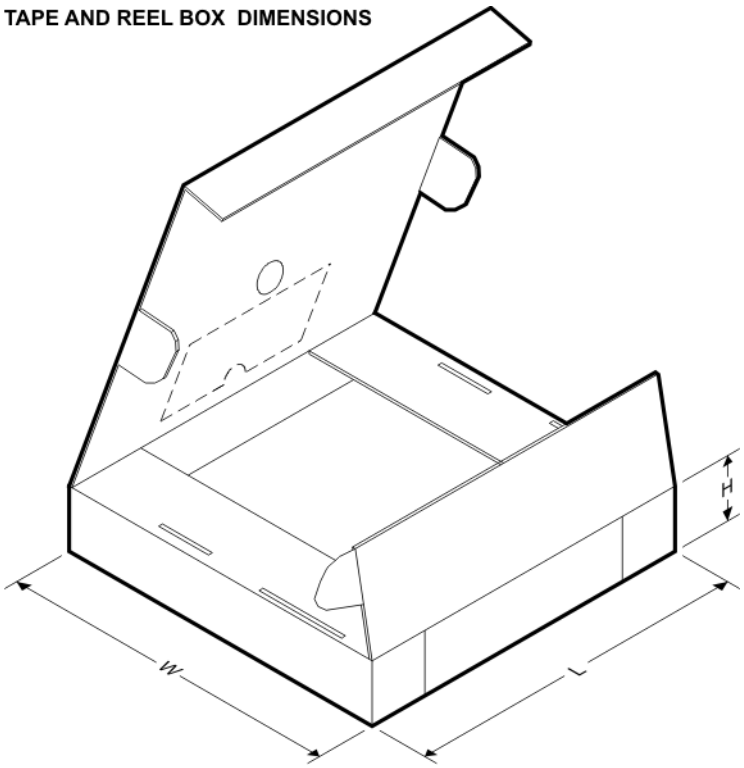
**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**




*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SN74ABT827DBR | SSOP | DB | 24 | 2000 | 330.0 | 16.4 | 8.2 | 8.8 | 2.5 | 12.0 | 16.0 | Q1 |
| SN74ABT827DWR | SOIC | DW | 24 | 2000 | 330.0 | 24.4 | 10.75 | 15.7 | 2.7 | 12.0 | 24.0 | Q1 |
| SN74ABT827PWR | TSSOP | PW | 24 | 2000 | 330.0 | 16.4 | 6.95 | 8.3 | 1.6 | 8.0 | 16.0 | Q1 |

TAPE AND REEL BOX DIMENSIONS



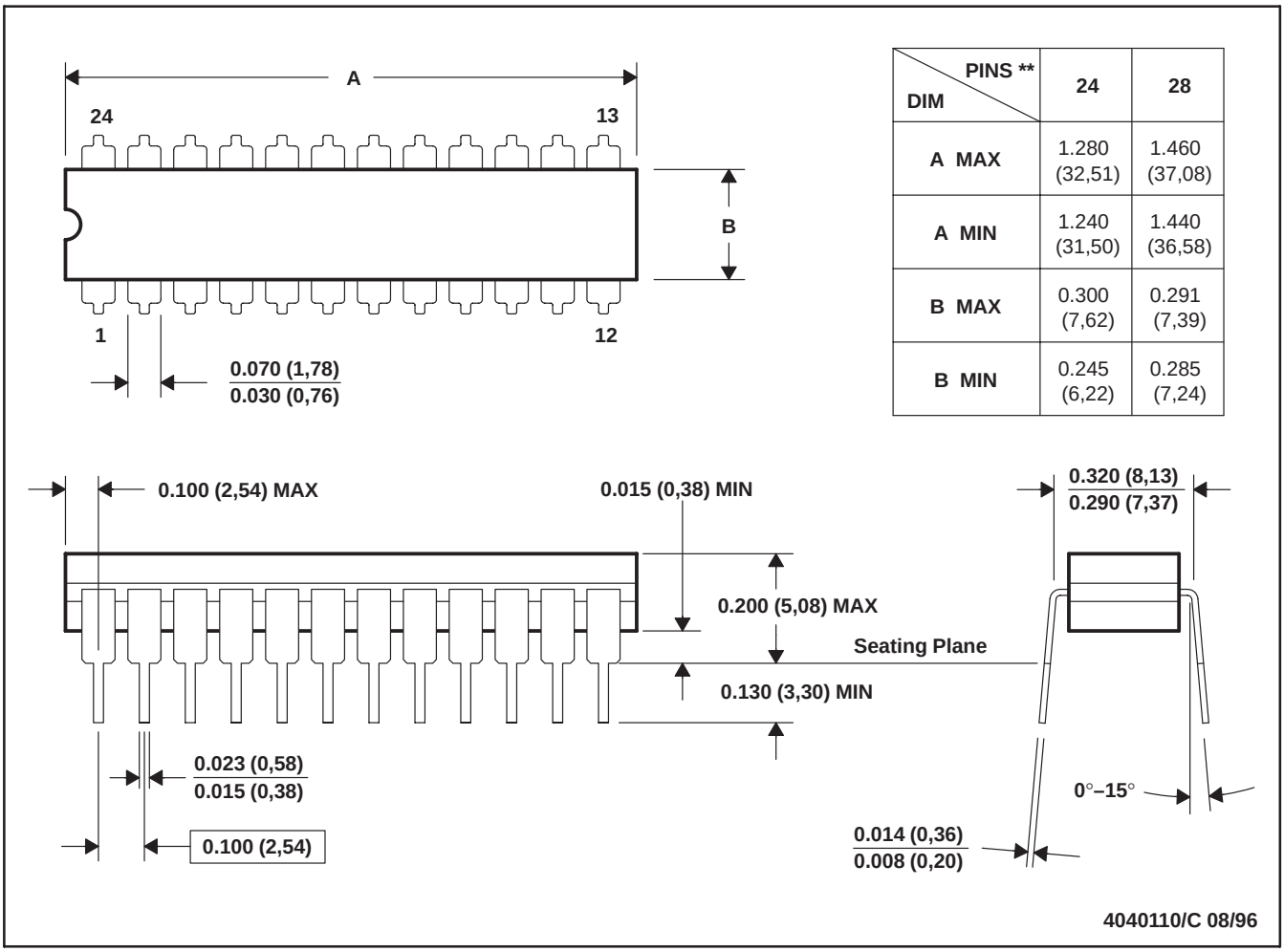

*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---|---|---|---|---|---|---|---|
| SN74ABT827DBR | SSOP | DB | 24 | 2000 | 367.0 | 367.0 | 38.0 |
| SN74ABT827DWR | SOIC | DW | 24 | 2000 | 350.0 | 350.0 | 43.0 |
| SN74ABT827PWR | TSSOP | PW | 24 | 2000 | 367.0 | 367.0 | 38.0 |

MCER004A – JANUARY 1995 – REVISED JANUARY 1997

**JT (R-GDIP-T**)** **CERAMIC DUAL-IN-LINE**

**24 LEADS SHOWN**




| DIM \ PINS ** | 24 | 28 |
|---|---|---|
| A MAX | 1.280 (32,51) | 1.460 (37,08) |
| A MIN | 1.240 (31,50) | 1.440 (36,58) |
| B MAX | 0.300 (7,62) | 0.291 (7,39) |
| B MIN | 0.245 (6,22) | 0.285 (7,24) |

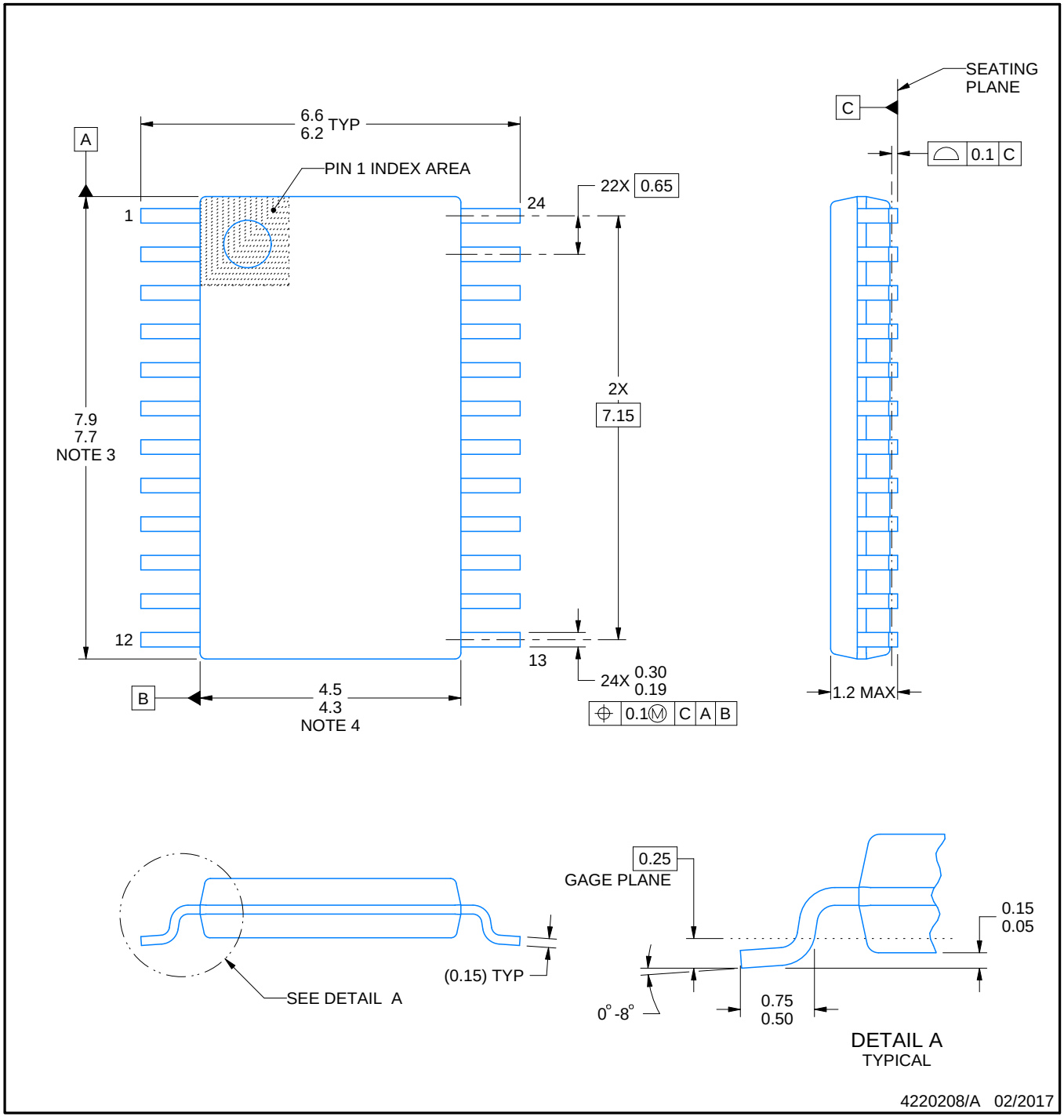
NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification.
E. Falls within MIL STD 1835 GDIP3-T24, GDIP4-T28, and JEDEC MO-058 AA, MO-058 AB

# PACKAGE OUTLINE

## PW0024A

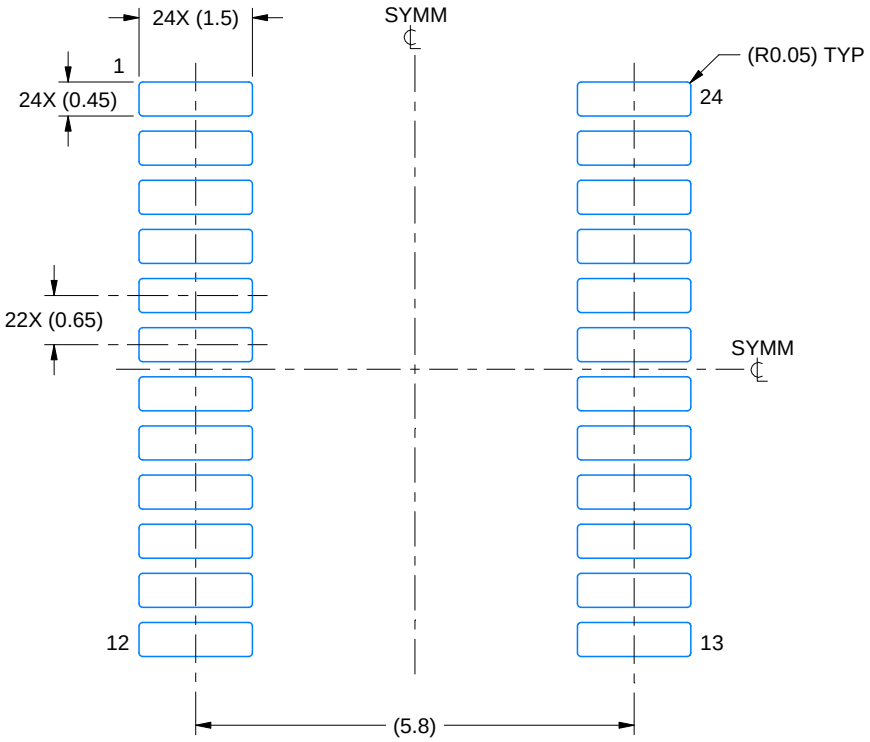
## TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE

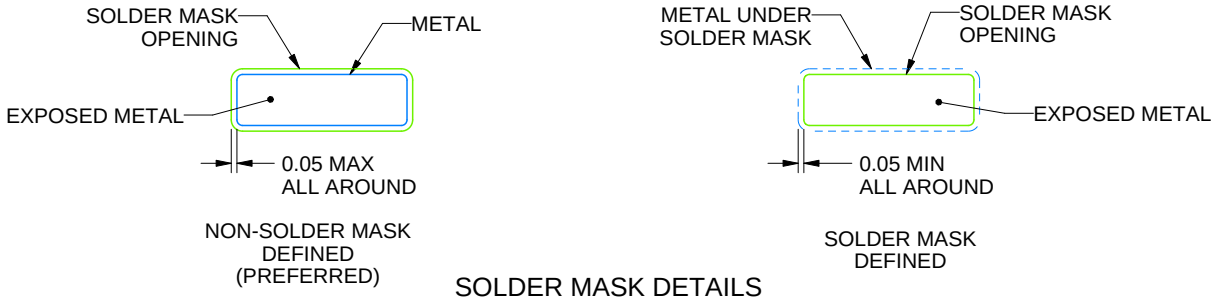



NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.




LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X




SOLDER MASK DETAILS

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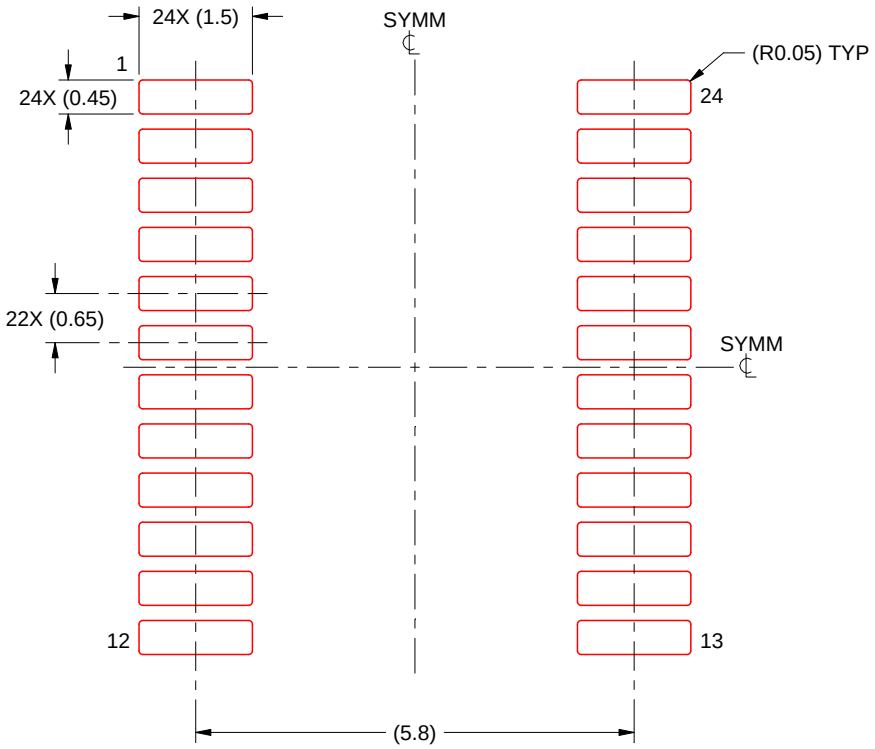
NOTES: (continued)

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



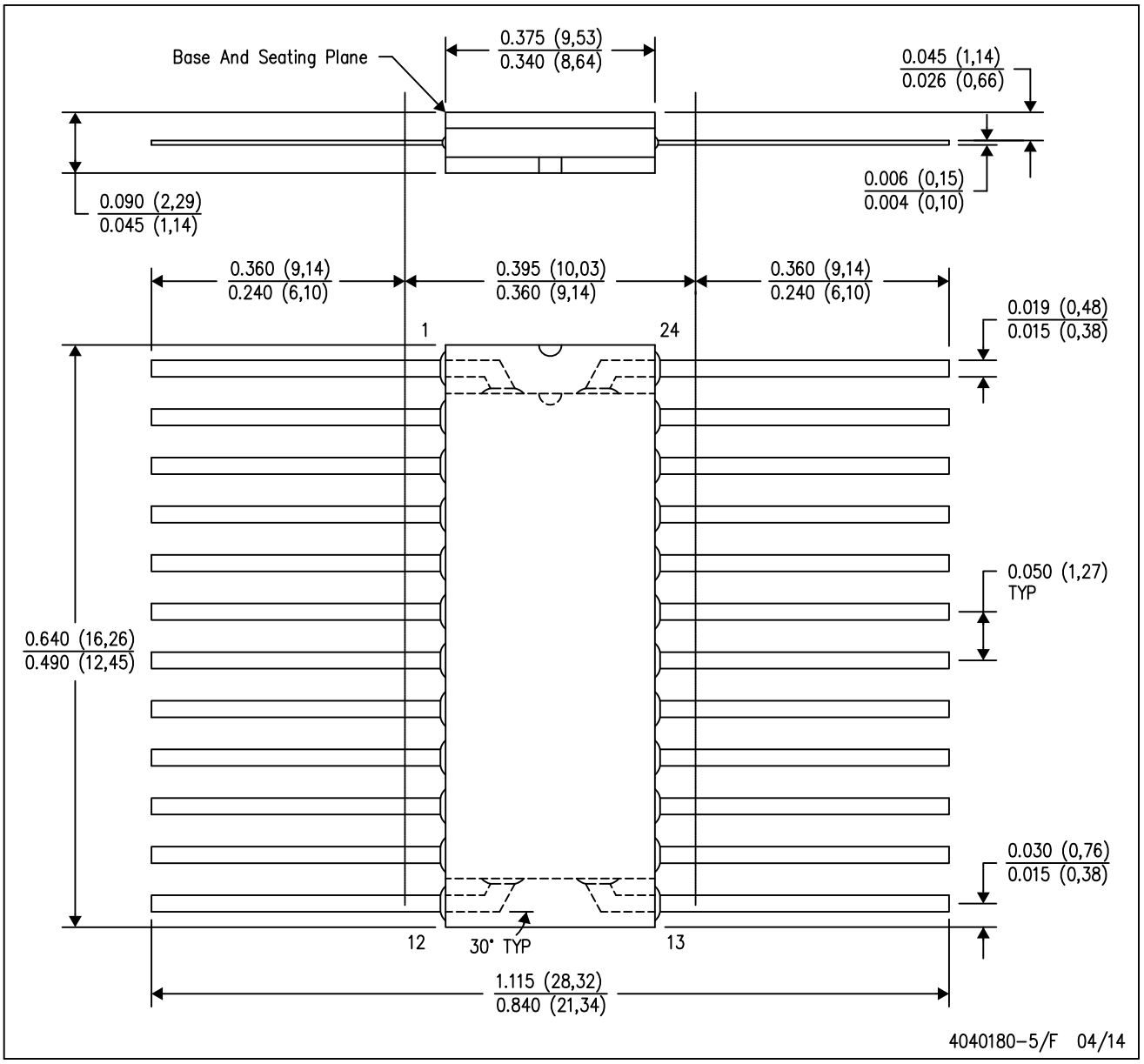

SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4220208/A 02/2017

NOTES: (continued)

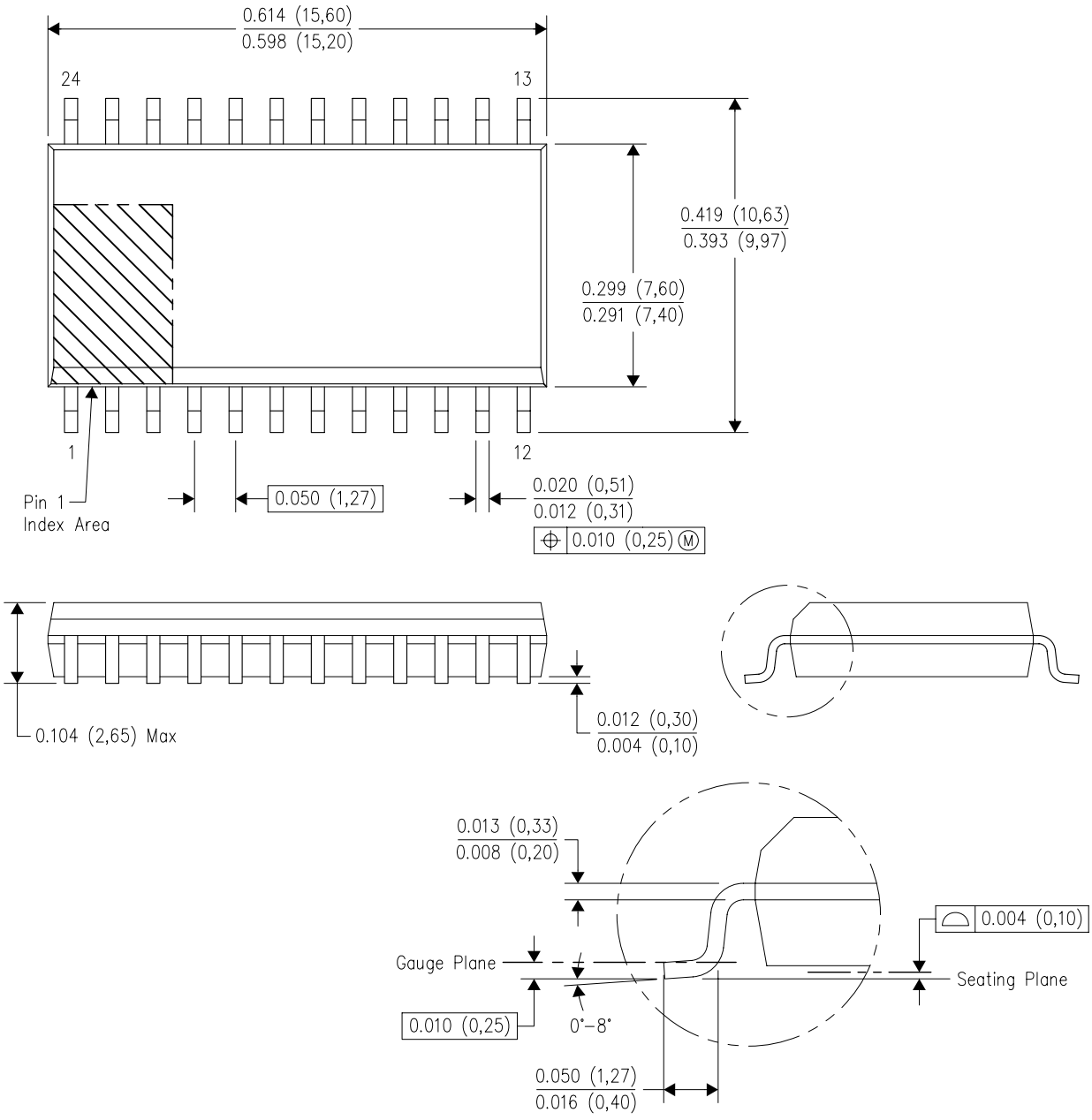
8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

W (R–GDFP–F24) CERAMIC DUAL FLATPACK



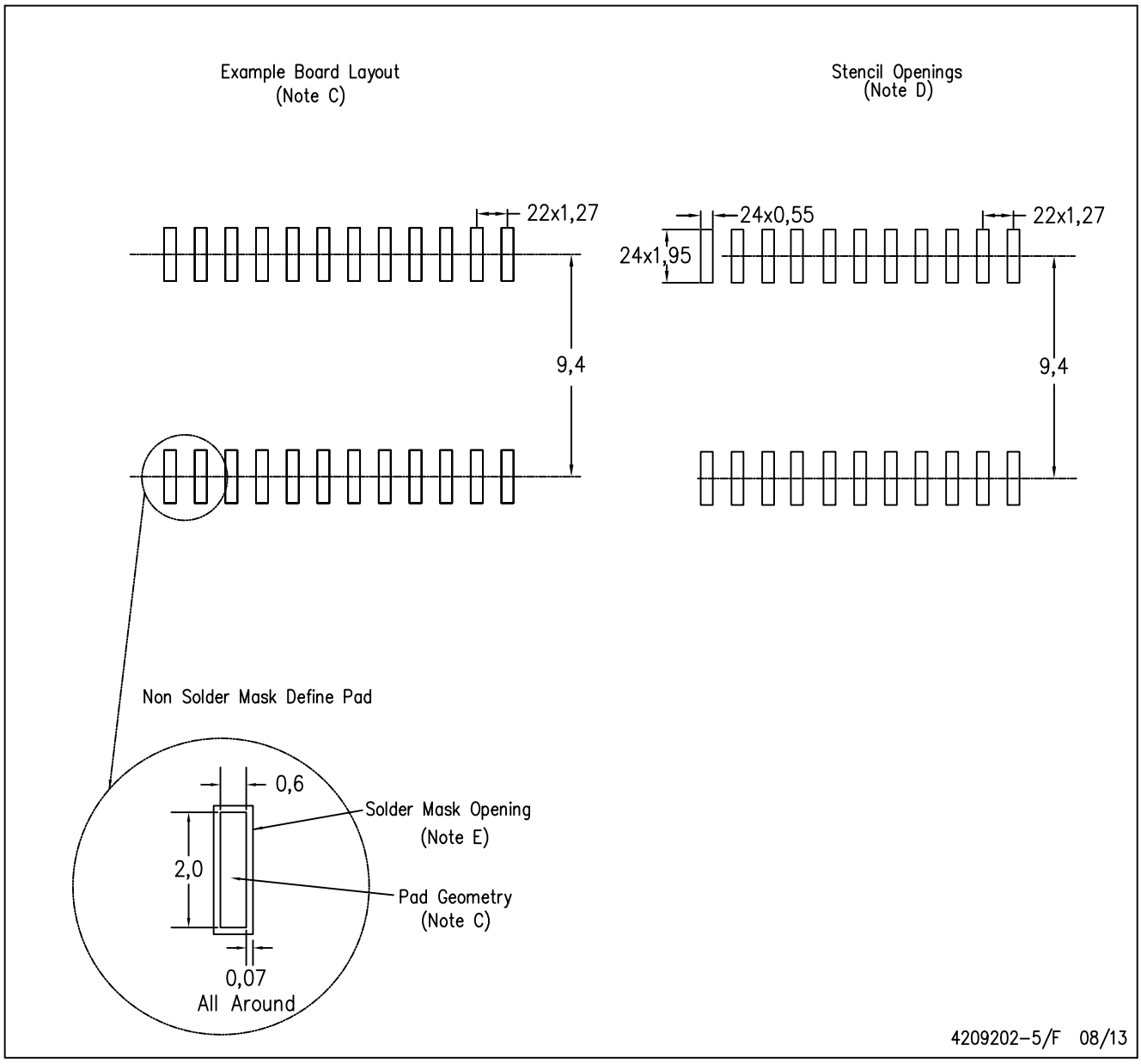

NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification only.
E. Falls within Mil–Std 1835 GDFP2–F20

DW (R–PDSO–G24) PLASTIC SMALL OUTLINE




NOTES:
A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M–1994.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
D. Falls within JEDEC MS–013 variation AD.

DW (R–PDSO–G24) PLASTIC SMALL OUTLINE

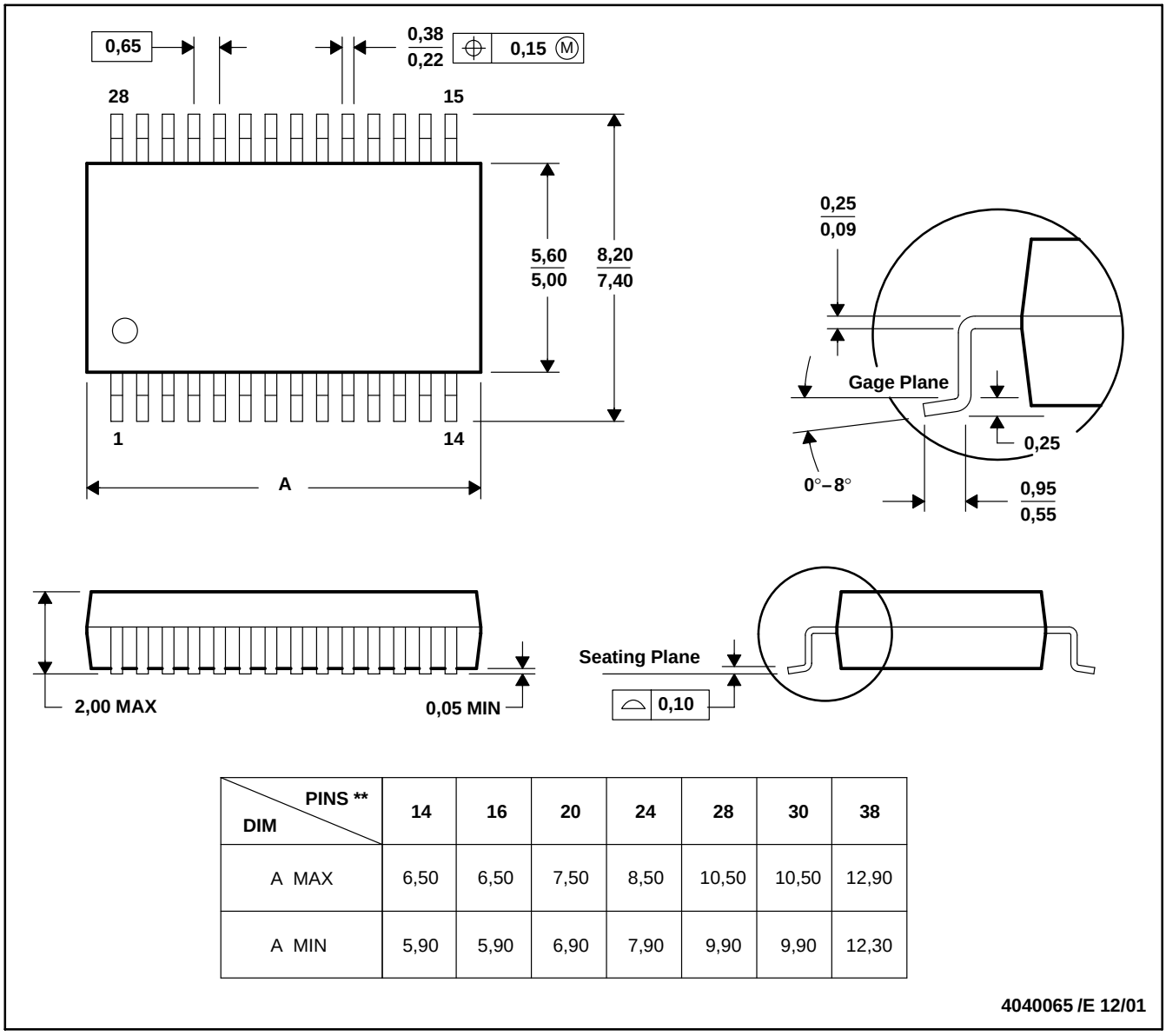



NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Refer to IPC7351 for alternate board design.
D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC–7525
E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

MSSO002E – JANUARY 1995 – REVISED DECEMBER 2001

**DB (R-PDSO-G**)** **PLASTIC SMALL-OUTLINE**

**28 PINS SHOWN**




| DIM \ PINS ** | 14 | 16 | 20 | 24 | 28 | 30 | 38 |
|---|---|---|---|---|---|---|---|
| A MAX | 6,50 | 6,50 | 7,50 | 8,50 | 10,50 | 10,50 | 12,90 |
| A MIN | 5,90 | 5,90 | 6,90 | 7,90 | 9,90 | 9,90 | 12,30 |

**4040065 /E 12/01**

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.
D. Falls within JEDEC MO-150

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