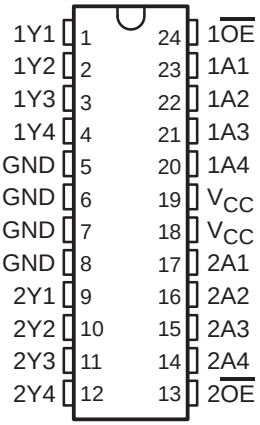
- ***EPIC***™ **(Enhanced-Performance Implanted CMOS ) 1-μm Process**
- **3-State Outputs Drive Bus Lines or Buffer Memory Address Registers**
- **Flow-Through Architecture Optimizes PCB Layout**
- **Center-Pin $V_{CC}$ and GND Pin Configurations Minimize High-Speed Switching Noise**
- **500-mA Typical Latch-Up Immunity at 125°C**
- **Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB), and Thin Shrink Small-Outline (PW) Packages, and Standard Plastic DIPs (NT)**

**DB, DW, NT, OR PW PACKAGE**
**(TOP VIEW)**




## description

The 74AC11244 is an octal buffer or line driver designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. The device can be used as two 4-bit buffers or one 8-bit buffer, with active-low output-enable ($\overline{OE}$) inputs.

When $\overline{OE}$ is low, the device passes noninverted data from the A inputs to the Y outputs. When $\overline{OE}$ is high, the outputs are in the high-impedance state.

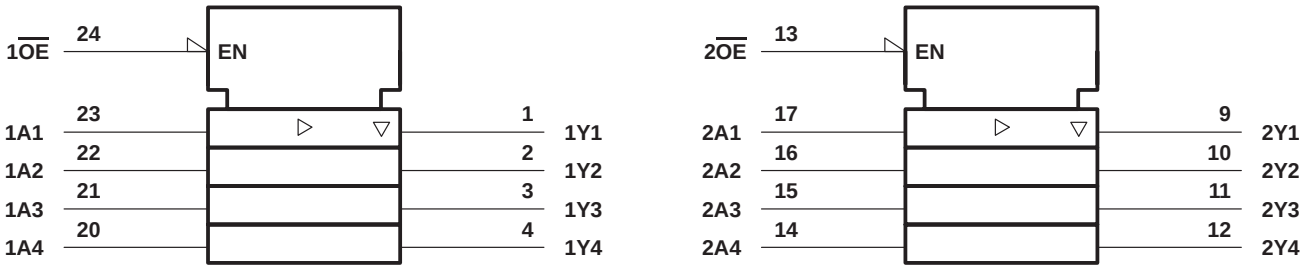
To ensure the high-impedance state during power up or power down, $\overline{OE}$ should be tied to $V_{CC}$ through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

The 74AC11244 is characterized for operation from –40°C to 85°C.

**FUNCTION TABLE**
**(each driver)**

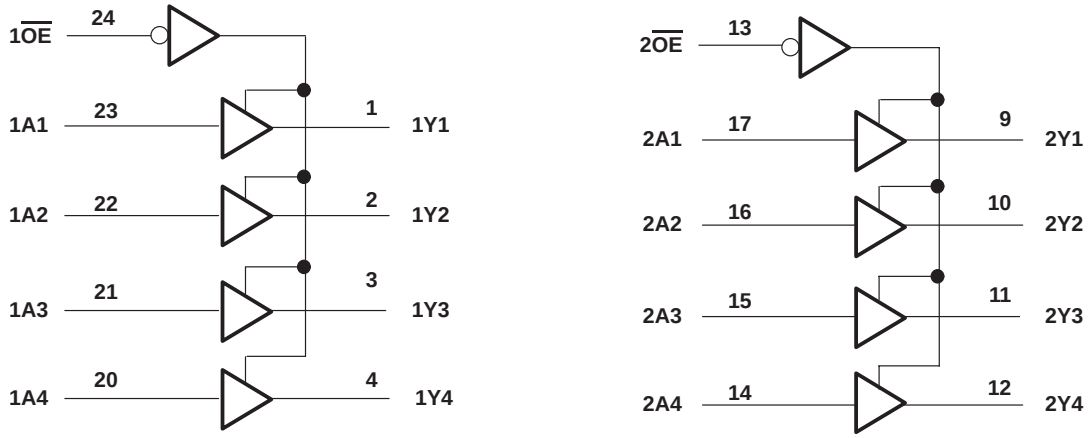
| INPUTS | | OUTPUT |
|---|---|---|
| $\overline{OE}$ | A | Y |
| L | H | H |
| L | L | L |
| H | X | Z |

## logic symbol†




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

## logic diagram (positive logic)




## 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 $V_{CC}$ + 0.5 V
Output voltage range, $V_O$ (see Note 1) . . . . . –0.5 V to $V_{CC}$ + 0.5 V
Input clamp current, $I_{IK}$ ($V_I$ < 0 or $V_I$ > $V_{CC}$) . . . . . ±20 mA
Output clamp current, $I_{OK}$ ($V_O$ < 0 or $V_O$ > $V_{CC}$) . . . . . ±50 mA
Continuous output current, $I_O$ ($V_O$ = 0 to $V_{CC}$) . . . . . ±50 mA
Continuous current through $V_{CC}$ or GND . . . . . ±200 mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): DB package . . . . . 104°C/W
DW package . . . . . 81°C/W
PW package . . . . . 120°C/W
NT package . . . . . 67°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 voltage ratings may be exceeded if the input and output current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51, except for through-hole packages, which use a trace length of zero.

## recommended operating conditions (see Note 3)

| | | | MIN | NOM | MAX | UNIT |
|---|---|---|---|---|---|---|
| $V_{CC}$ | Supply voltage | | 3 | 5 | 5.5 | V |
| $V_{IH}$ | High-level input voltage | $V_{CC}$ = 3 V | 2.1 | | | V |
| | | $V_{CC}$ = 4.5 V | 3.15 | | | |
| | | $V_{CC}$ = 5.5 V | 3.85 | | | |
| $V_{IL}$ | Low-level input voltage | $V_{CC}$ = 3 V | | | 0.9 | V |
| | | $V_{CC}$ = 4.5 V | | | 1.35 | |
| | | $V_{CC}$ = 5.5 V | | | 1.65 | |
| $V_I$ | Input voltage | | 0 | | $V_{CC}$ | V |
| $V_O$ | Output voltage | | 0 | | $V_{CC}$ | V |
| $I_{OH}$ | High-level output current | $V_{CC}$ = 3 V | | | –4 | mA |
| | | $V_{CC}$ = 4.5 V | | | –24 | |
| | | $V_{CC}$ = 5.5 V | | | –24 | |
| $I_{OL}$ | Low-level output current | $V_{CC}$ = 3 V | | | 12 | mA |
| | | $V_{CC}$ = 4.5 V | | | 24 | |
| | | $V_{CC}$ = 5.5 V | | | 24 | |
| $\Delta t/\Delta v$ | Input transition rise or fall rate | | 0 | | 10 | ns/V |
| $T_A$ | Operating free-air temperature | | –40 | | 85 | °C |

NOTE 3: All unused inputs of the device must be held at $V_{CC}$ or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

| PARAMETER | TEST CONDITIONS | $V_{CC}$ | $T_A$ = 25°C | | | MIN | MAX | UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | | | |
| $V_{OH}$ | $I_{OH}$ = –50 μA | 3 V | 2.9 | | | 2.9 | | V |
| | | 4.5 V | 4.4 | | | 4.4 | | |
| | | 5.5 V | 5.4 | | | 5.4 | | |
| | $I_{OH}$ = –4 mA | 3 V | 2.58 | | | 2.48 | | |
| | $I_{OL}$ = –24 mA | 4.5 V | 3.94 | | | 3.8 | | |
| | | 5.5 V | 4.94 | | | 4.8 | | |
| | $I_{OH}$ = –75 mA† | 5.5 V | | | | 3.85 | | |
| $V_{OL}$ | $I_{OL}$ = 50 μA | 3 V | | | 0.1 | | 0.1 | V |
| | | 4.5 V | | | 0.1 | | 0.1 | |
| | | 5.5 V | | | 0.1 | | 0.1 | |
| | $I_{OL}$ = 12 mA | 3 V | | | 0.36 | | 0.44 | |
| | $I_{OL}$ = 24 mA | 4.5 V | | | 0.36 | | 0.44 | |
| | | 5.5 V | | | 0.36 | | 0.44 | |
| | $I_{OL}$ = 75 mA† | 5.5 V | | | | | 1.65 | |
| $I_I$ | $V_I$ = $V_{CC}$ or GND | 5.5 V | | | ±0.1 | | ±1 | μA |
| $I_{OZ}$ | $V_O$ = $V_{CC}$ or GND | 5.5 V | | | ±0.5 | | ±5 | μA |
| $I_{CC}$ | $V_I$ = $V_{CC}$ or GND, $I_O$ = 0 | 5.5 V | | | 8 | | 80 | μA |
| $C_i$ | $V_I$ = $V_{CC}$ or GND | 5 V | | 4 | | | | pF |
| $C_o$ | $V_O$ = $V_{CC}$ or GND | 5 V | | 10 | | | | pF |

† Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.

### switching characteristics over recommended operating free-air temperature range, $V_{CC}$ = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $T_A$ = 25°C | | | MIN | MAX | UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | | | |
| $t_{PLH}$ | A | Y | 1.5 | 7.1 | 9.3 | 1.5 | 10.2 | ns |
| $t_{PHL}$ | | | 1.5 | 6.3 | 8.6 | 1.5 | 9.5 | |
| $t_{PZH}$ | $\overline{OE}$ | Y | 1.5 | 8 | 10.7 | 1.5 | 11.8 | ns |
| $t_{PZL}$ | | | 1.5 | 7.9 | 10.6 | 1.5 | 11.9 | |
| $t_{PHZ}$ | $\overline{OE}$ | Y | 1.5 | 5.9 | 7.9 | 1.5 | 8.3 | ns |
| $t_{PLZ}$ | | | 1.5 | 7.2 | 9.4 | 1.5 | 9.9 | |

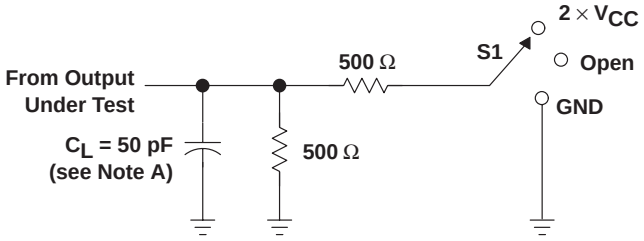
### switching characteristics over recommended operating free-air temperature range, $V_{CC}$ = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $T_A$ = 25°C | | | MIN | MAX | UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | | | |
| $t_{PLH}$ | A | Y | 1.5 | 4.9 | 6.7 | 1.5 | 7.3 | ns |
| $t_{PHL}$ | | | 1.5 | 4.5 | 6.4 | 1.5 | 6.9 | |
| $t_{PZH}$ | $\overline{OE}$ | Y | 1.5 | 5.4 | 7.7 | 1.5 | 8.5 | ns |
| $t_{PZL}$ | | | 1.5 | 5.4 | 7.6 | 1.5 | 8.5 | |
| $t_{PHZ}$ | $\overline{OE}$ | Y | 1.5 | 5.2 | 7 | 1.5 | 7.3 | ns |
| $t_{PLZ}$ | | | 1.5 | 5.8 | 7.8 | 1.5 | 8.2 | |

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

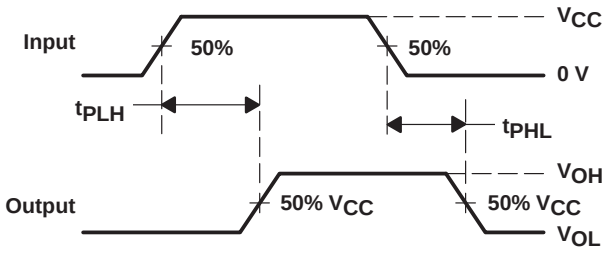
| PARAMETER | | | TEST CONDITIONS | | TYP | UNIT |
|---|---|---|---|---|---|---|
| $C_{pd}$ | Power dissipation capacitance per buffer/driver | Outputs enabled | $C_L$ = 50 pF, | f = 1 MHz | 27 | pF |
| | | Outputs disabled | | | 9 | |

## PARAMETER MEASUREMENT INFORMATION

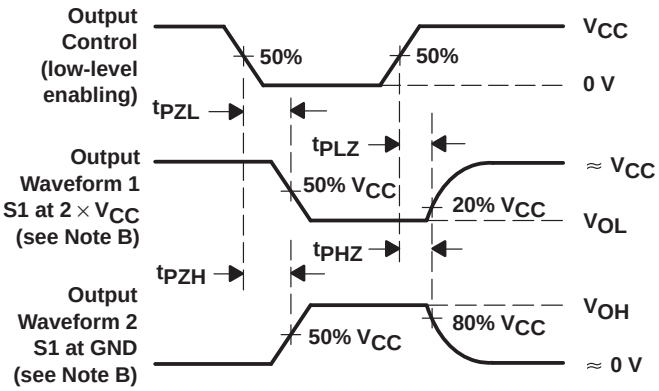



| TEST | S1 |
|---|---|
| $t_{PLH}/t_{PHL}$ | Open |
| $t_{PLZ}/t_{PZL}$ | 2 × $V_{CC}$ |
| $t_{PHZ}/t_{PZH}$ | GND |

LOAD CIRCUIT




VOLTAGE WAVEFORMS




VOLTAGE WAVEFORMS

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 ≤ 1 MHz, $Z_O$ = 50 Ω, $t_r$ = 3 ns, $t_f$ = 3 ns.
D. The outputs are measured one at a time with one input transition per measurement.

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

## PACKAGING INFORMATION

| Orderable part number | Status (1) | Material type (2) | Package \| Pins | Package qty \| Carrier | RoHS (3) | Lead finish/ Ball material (4) | MSL rating/ Peak reflow (5) | Op temp (°C) | Part marking (6) |
|---|---|---|---|---|---|---|---|---|---|
| 74AC11244DBR | Active | Production | SSOP (DB) \| 24 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | AE244 |
| 74AC11244DBR.A | Active | Production | SSOP (DB) \| 24 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | AE244 |
| 74AC11244DW | Obsolete | Production | SOIC (DW) \| 24 | - | - | Call TI | Call TI | -40 to 85 | AC11244 |
| 74AC11244DWR | Active | Production | SOIC (DW) \| 24 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | AC11244 |
| 74AC11244DWR.A | Active | Production | SOIC (DW) \| 24 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | AC11244 |
| 74AC11244PW | Obsolete | Production | TSSOP (PW) \| 24 | - | - | Call TI | Call TI | -40 to 85 | AE244 |
| 74AC11244PWR | Active | Production | TSSOP (PW) \| 24 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | AE244 |
| 74AC11244PWR.A | Active | Production | TSSOP (PW) \| 24 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | AE244 |

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

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

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

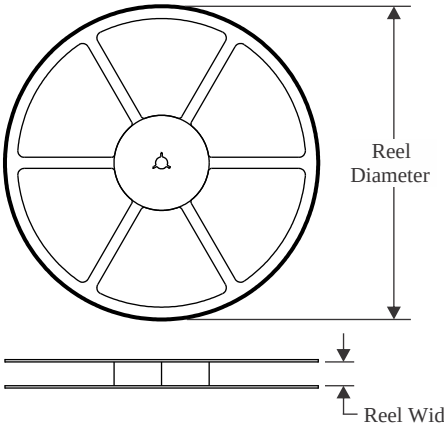
(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

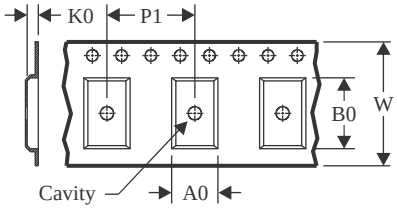
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

## TAPE AND REEL INFORMATION

**REEL DIMENSIONS**

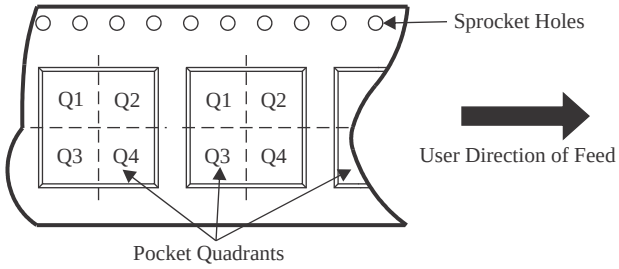



**TAPE DIMENSIONS**




| | |
|---|---|
| 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 |

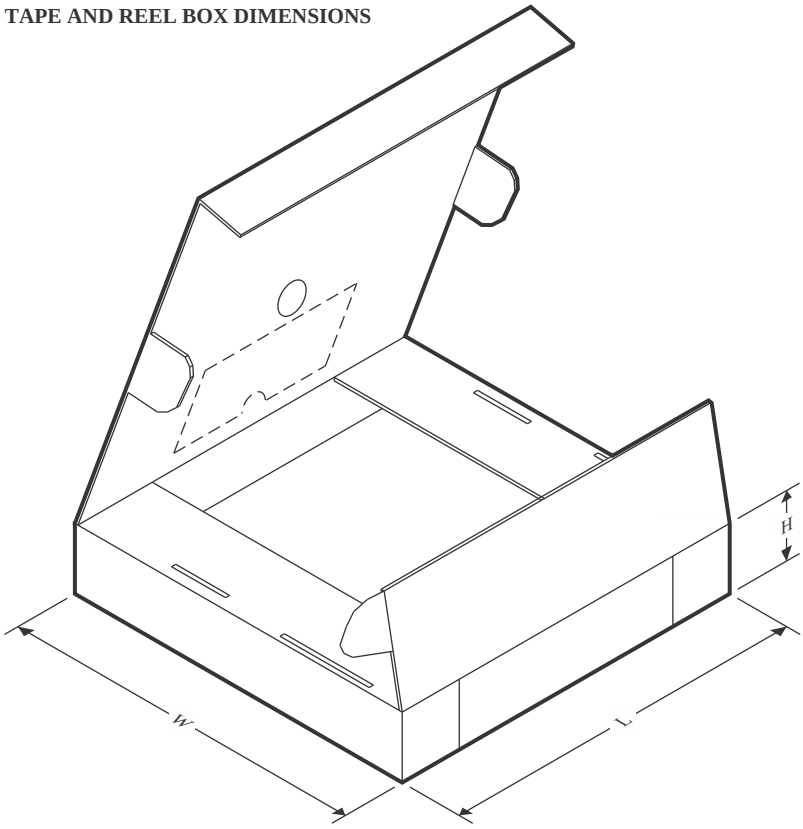
**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**




*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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 74AC11244DBR | SSOP | DB | 24 | 2000 | 330.0 | 16.4 | 8.2 | 8.8 | 2.5 | 12.0 | 16.0 | Q1 |
| 74AC11244DWR | SOIC | DW | 24 | 2000 | 330.0 | 24.4 | 10.75 | 15.7 | 2.7 | 12.0 | 24.0 | Q1 |

TAPE AND REEL BOX DIMENSIONS




*All dimensions are nominal

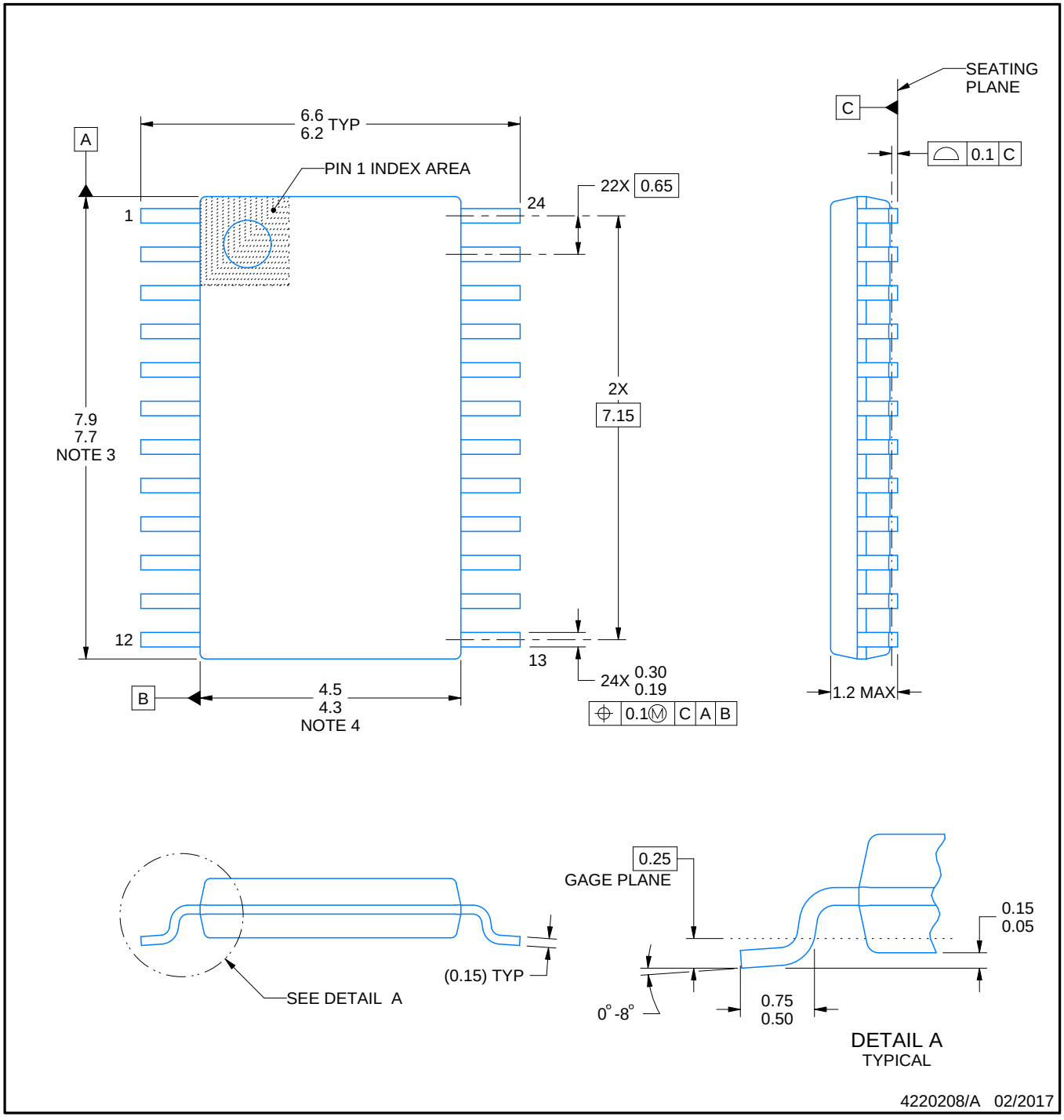
| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---|---|---|---|---|---|---|---|
| 74AC11244DBR | SSOP | DB | 24 | 2000 | 353.0 | 353.0 | 32.0 |
| 74AC11244DWR | SOIC | DW | 24 | 2000 | 350.0 | 350.0 | 43.0 |

# PACKAGE OUTLINE

## PW0024A

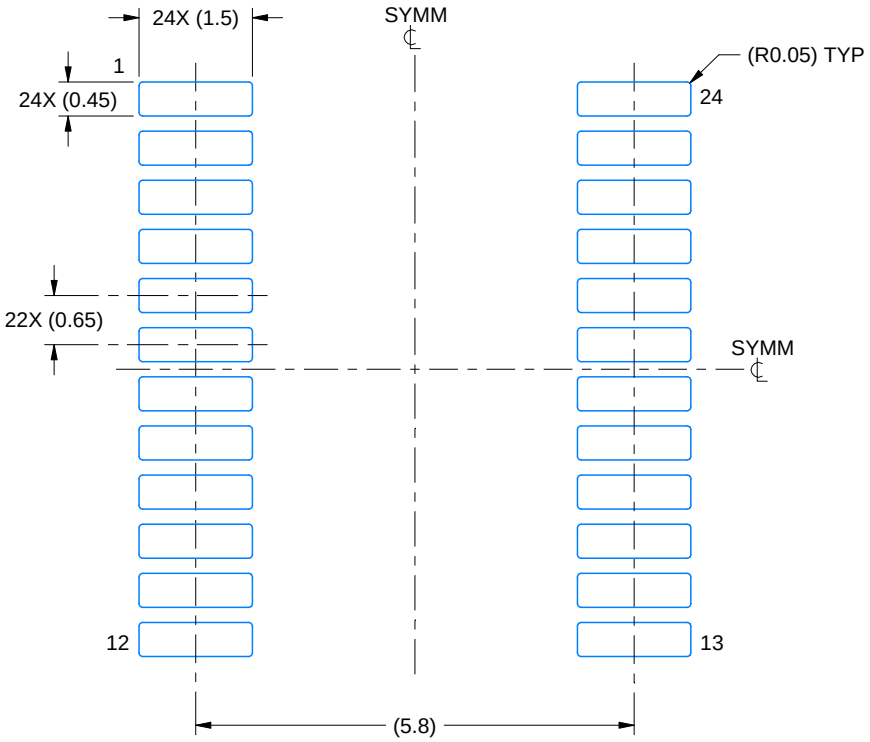
## TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE

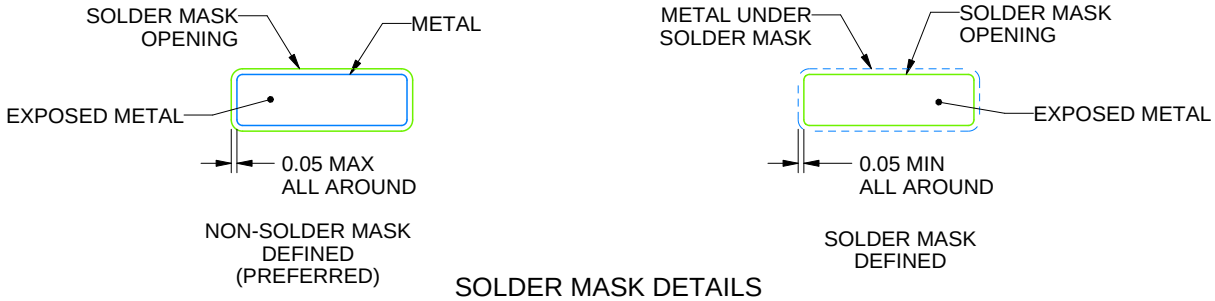



NOTES:

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

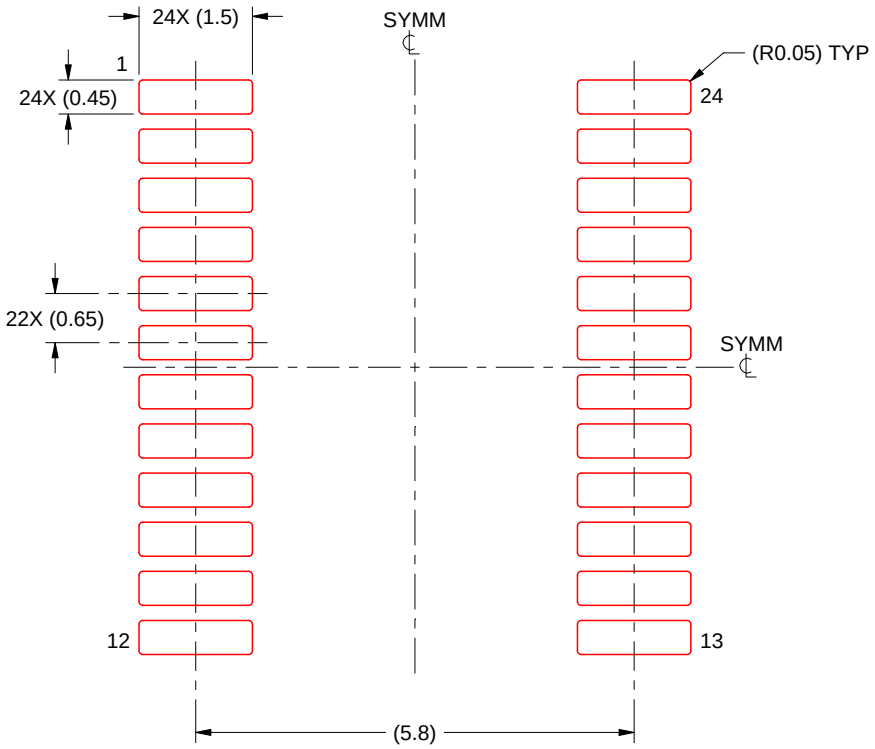



SOLDER MASK DETAILS

4220208/A 02/2017

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.



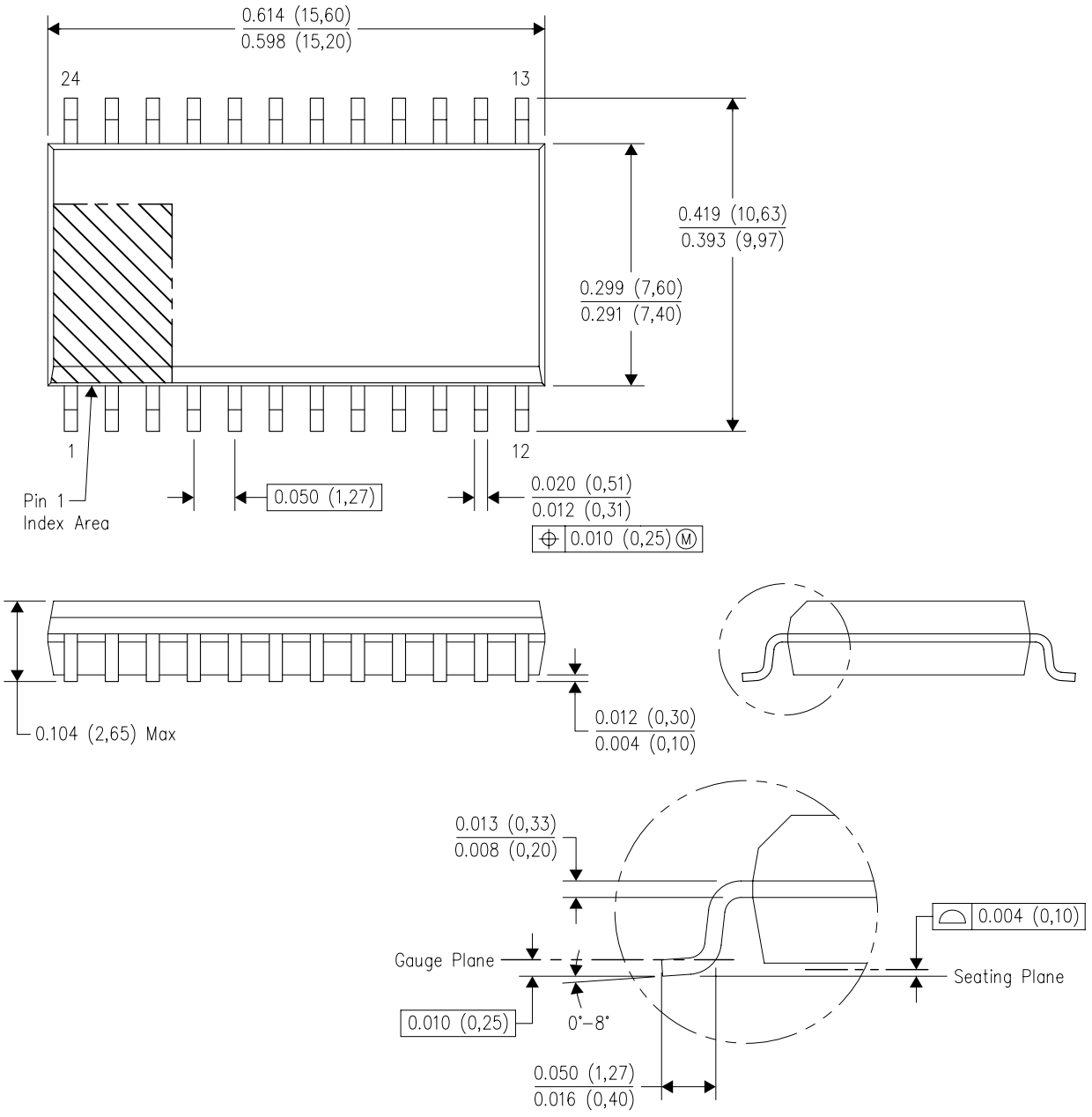

SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

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.

DW (R–PDSO–G24) PLASTIC SMALL OUTLINE

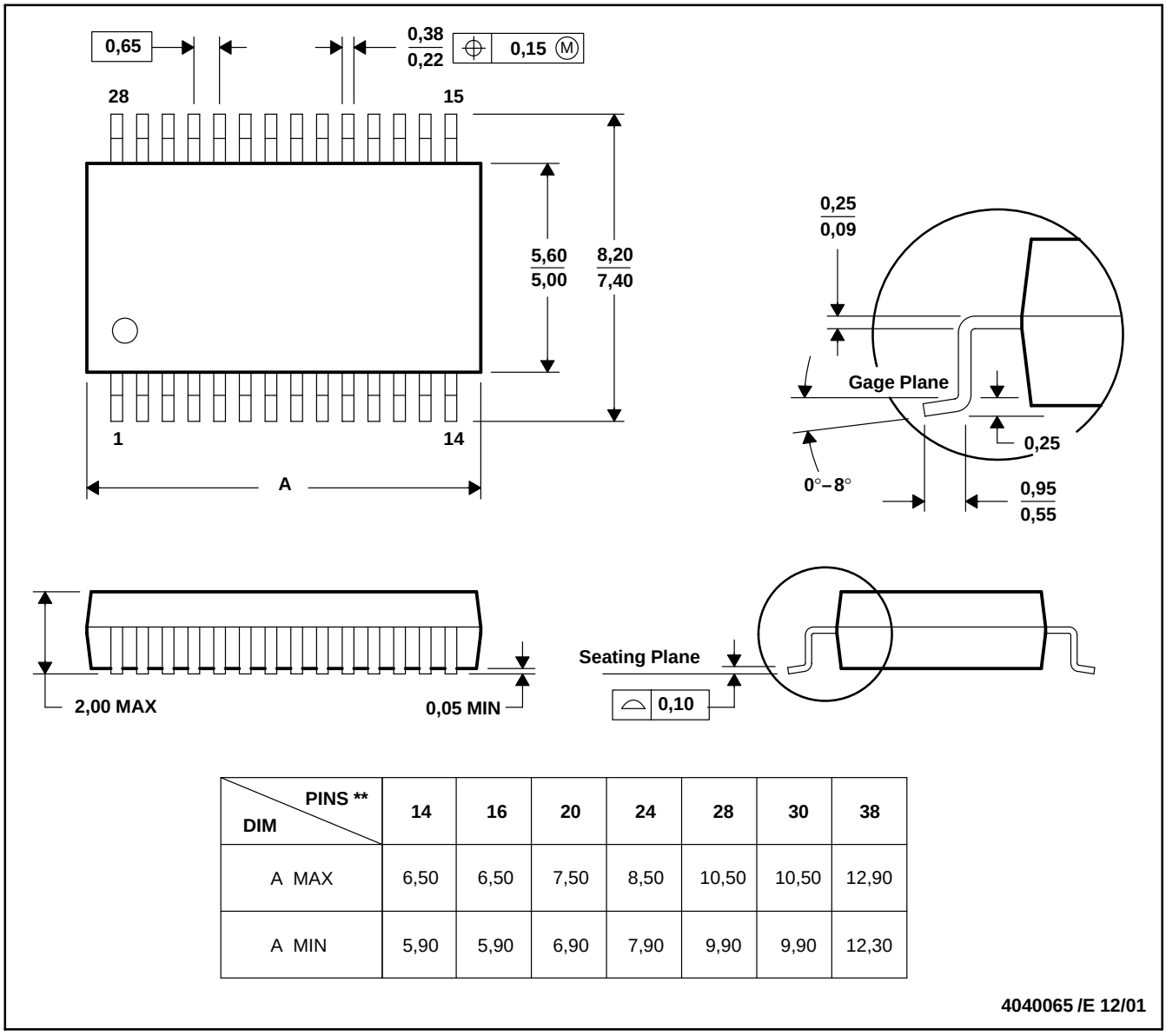



NOTES:
A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M–1994.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
D. Falls within JEDEC MS–013 variation AD.

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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