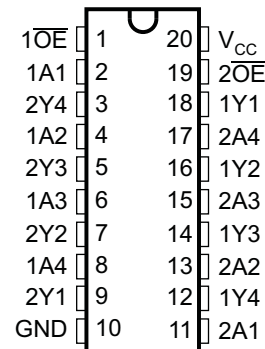


## FEATURES

- **Controlled Baseline**  
– One Assembly/Test Site, One Fabrication Site
- **Extended Temperature Performance of –55°C to 125°C**
- **Enhanced Diminishing Manufacturing Sources (DMS) Support**
- **Enhanced Product-Change Notification**
- **Qualification Pedigree <sup>(1)</sup>**
- **State-of-the-Art EPIC-IIB™ BiCMOS Design Significantly Reduces Power Dissipation**
- **Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17**
- **ESD Protection Exceeds 2000 V Per MIL-STD-883, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)**
- **Typical  $V_{OLP}$  (Output Ground Bounce) <1 V at  $V_{CC} = 5 V, T_A = 25^\circ C$**
- **High-Drive Outputs (–24-mA  $I_{OH}$ , 48-mA  $I_{OL}$ )**
- **Packaged in Shrink Small-Outline (DB) Package**

(1) Component qualification in accordance with JEDEC and industry standards to ensure reliable operation over an extended temperature range. This includes, but is not limited to, Highly Accelerated Stress Test (HAST) or biased 85/85, temperature cycle, autoclave or unbiased HAST, electromigration, bond intermetallic life, and mold compound life. Such qualification testing should not be viewed as justifying use of this component beyond specified performance and environmental limits.

DB PACKAGE  
(TOP VIEW)



## DESCRIPTION

This octal buffer and line driver is designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. Together with the SN54ABT240, SN74ABT240A, SN54ABT241, and SN74ABT241A, these devices provide the choice of selected combinations of inverting and noninverting outputs, symmetrical active-low output-enable ( $\overline{OE}$ ) inputs, and complementary OE and  $\overline{OE}$  inputs.

The SN74ABT244A is organized as two 4-bit buffers/line drivers with separate  $\overline{OE}$  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 SN74ABT244 is characterized for operation over the full military temperature range of –55°C to 125°C.

## ORDERING INFORMATION

| $T_A$          | PACKAGE <sup>(1)</sup>     | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|----------------------------|-----------------------|------------------|
| –55°C to 125°C | SSOP – DB<br>Tape and reel | SN74ABT244AMDBREP     | ABT244AMEP       |

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



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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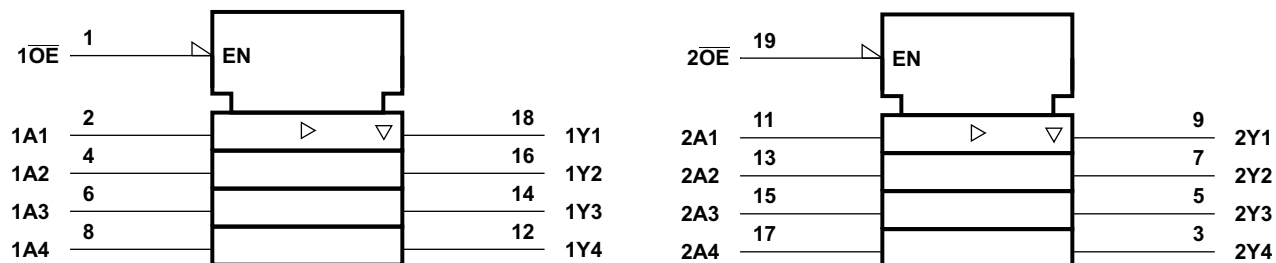
# SN74ABT244A-EP OCTAL BUFFER/DRIVER WITH 3-STATE OUTPUTS

SGBS312A—JULY 2006—REVISED JULY 2006

**FUNCTION TABLE  
(EACH BUFFER)**

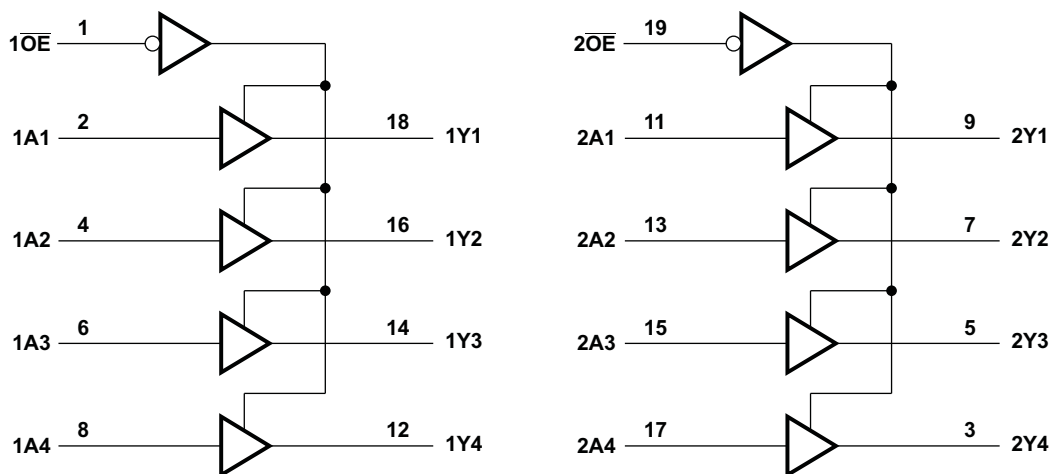
| INPUTS          |   | OUTPUT |
|-----------------|---|--------|
| $\overline{OE}$ | A | Y      |
| L               | H | H      |
| L               | L | L      |
| H               | X | Z      |

**LOGIC SYMBOL<sup>(1)</sup>**



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

**LOGIC DIAGRAM (POSITIVE LOGIC)**



### Absolute Maximum Ratings<sup>(1)</sup>

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

|                  |  | MIN                | MAX | UNIT |
|------------------|--|--------------------|-----|------|
| V <sub>CC</sub>  | Supply voltage range   | -0.5               | 7   | V    |
| V <sub>I</sub>   | Input voltage range <sup>(2)</sup>                                 | -0.5               | 7   | V    |
| V <sub>O</sub>   | Voltage range applied to any output in the high or power-off state | -0.5               | 5.5 | V    |
| I <sub>O</sub>   | Current into any output in the low state                           |                    | 96  | mA   |
| I <sub>IK</sub>  | Input clamp current  | V <sub>I</sub> < 0 | -18 | mA   |
| I <sub>OK</sub>  | Output clamp current   | V <sub>O</sub> < 0 | -50 | mA   |
| θ <sub>JA</sub>  | Package thermal impedance <sup>(3)</sup>                           |                    | 115 | °C/W |
| T <sub>stg</sub> | Storage temperature range  | -65                | 150 | °C   |

- (1) 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.
- (2) The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
- (3) 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<sup>(1)</sup>

|                 |                                    | MIN | MAX             | UNIT |
|-----------------|------------------------------------|-----|-----------------|------|
| V <sub>CC</sub> | Supply voltage                     | 4.5 | 5.5             | V    |
| V <sub>IH</sub> | High-level input voltage           | 2   |                 | V    |
| V <sub>IL</sub> | Low-level input voltage            |     | 0.8             | V    |
| V <sub>I</sub>  | Input voltage                      | 0   | V <sub>CC</sub> | V    |
| I <sub>OH</sub> | High-level output current          |     | -24             | mA   |
| I <sub>OL</sub> | Low-level output current           |     | 48              | mA   |
| Δt/Δv           | Input transition rise or fall rate |     | 5               | ns/V |
|                 | Outputs enabled                    |     |                 |      |
| T <sub>A</sub>  | Operating free-air temperature     | -55 | 125             | °C   |

- (1) Unused inputs must be held high or low to prevent them from floating.

# SN74ABT244A-EP

## OCTAL BUFFER/DRIVER

### WITH 3-STATE OUTPUTS

SGBS312A–JULY 2006–REVISED JULY 2006

### Electrical Characteristics<sup>(1)</sup>

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

| PARAMETER                       | TEST CONDITIONS   |   | T <sub>A</sub> = 25°C |                    |      | MIN  | MAX  | UNIT |
|---------------------------------|---|---|-----------------------|--------------------|------|------|------|------|
|                                 |   |   | MIN                   | TYP <sup>(2)</sup> | MAX  |      |      |      |
| V <sub>IK</sub>                 | V <sub>CC</sub> = 4.5 V,  | I <sub>I</sub> = -18 mA   | -1.2                  |                    |      | -1.2 | V    |      |
| V <sub>OH</sub>                 | V <sub>CC</sub> = 4.5 V,  | I <sub>OH</sub> = -3 mA   | 2.5                   |                    |      | 2.5  | V    |      |
|                                 | V <sub>CC</sub> = 5 V,  | I <sub>OH</sub> = -3 mA   | 3                     |                    |      | 3    |      |      |
|                                 | V <sub>CC</sub> = 4.5 V,  | I <sub>OH</sub> = -24 mA  | 2                     |                    |      | 2    |      |      |
| V <sub>OL</sub>                 | V <sub>CC</sub> = 4.5 V,  | I <sub>OL</sub> = 48 mA   | 0.55                  |                    |      | 0.55 | V    |      |
| V <sub>hys</sub>                |   |   | 100                   |                    |      |      | mV   |      |
| I <sub>I</sub>                  | V <sub>CC</sub> = 5.5 V,  | V <sub>I</sub> = V <sub>CC</sub> or GND   | ±1                    |                    |      | ±1   | μA   |      |
| I <sub>OZH</sub>                | V <sub>CC</sub> = 5.5 V,  | V <sub>O</sub> = 2.7 V  | 10                    |                    |      | 10   | μA   |      |
| I <sub>OZL</sub>                | V <sub>CC</sub> = 5.5 V,  | V <sub>O</sub> = 0.5 V  | -10                   |                    |      | -10  | μA   |      |
| I <sub>off</sub>                | V <sub>CC</sub> = 0,  | V <sub>I</sub> or V <sub>O</sub> ≤ 5.5 V  | ±100                  |                    |      |      | μA   |      |
| I <sub>CEX</sub>                | V <sub>CC</sub> = 5.5 V,  | Outputs high  | 50                    |                    |      | 50   | μA   |      |
| I <sub>O</sub> <sup>(3)</sup>   | V <sub>CC</sub> = 5.5 V,  | V <sub>O</sub> = 2.5 V  | -50                   | -100               | -180 | -50  | -180 | mA   |
| I <sub>CC</sub>                 | V <sub>CC</sub> = 5.5 V, I <sub>O</sub> = 0,<br>V <sub>I</sub> = V <sub>CC</sub> or GND |   | Outputs high          |                    | 1    | 250  | 250  | μA   |
|                                 |   |   | Outputs low           |                    | 24   | 30   | 30   | mA   |
|                                 |   |   | Outputs disabled      |                    | 0.5  | 250  | 250  | μA   |
| ΔI <sub>CC</sub> <sup>(4)</sup> | Data inputs   | V <sub>CC</sub> = 5.5 V,<br>One input at 3.4 V,<br>Other inputs at V <sub>CC</sub> or GND | Outputs enabled       |                    | 1.5  | 1.5  | mA   |      |
|                                 |   |   | Outputs disabled      |                    | 0.05 | 0.05 |      |      |
|                                 | Control inputs  |   |                       |                    | 1.5  | 1.5  |      |      |
| C <sub>i</sub>                  | V <sub>I</sub> = 2.5 V or 0.5 V   |   | 3.5                   |                    |      |      | pF   |      |
| C <sub>o</sub>                  | V <sub>O</sub> = 2.5 V or 0.5 V   |   | 7.5                   |                    |      |      | pF   |      |

(1) On products compliant to MIL-PRF-38535, this parameter does not apply.

(2) All typical values are at V<sub>CC</sub> = 5 V.

(3) Not more than one output should be tested at a time, and the duration of the test should not exceed one second.

(4) This is the increase in supply current for each input that is at the specified TTL voltage level, rather than V<sub>CC</sub> or GND.

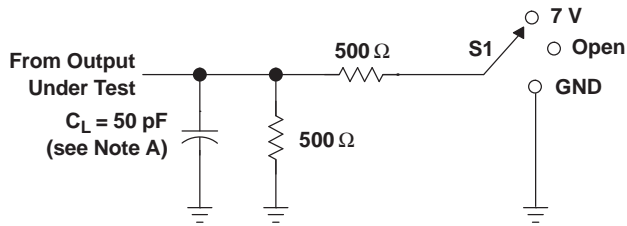
### Switching Characteristics

over recommended ranges of supply voltage and operating free-air temperature, C<sub>L</sub> = 50 pF (unless otherwise noted)

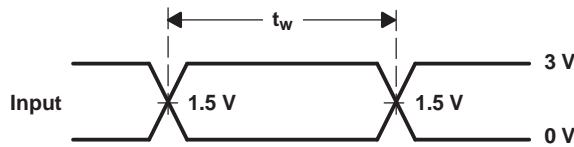
(see [Figure 1](#))

| PARAMETER        | FROM (INPUT)    | TO (OUTPUT) | V <sub>CC</sub> = 5 V,<br>T <sub>A</sub> = 25°C |     |     | MIN | MAX | UNIT |
|------------------|-----------------|-------------|---|-----|-----|-----|-----|------|
|                  |                 |             | MIN   | TYP | MAX |     |     |      |
| t <sub>PLH</sub> | A               | Y           | 1   | 2.6 | 4.1 | 1   | 5.3 | ns   |
| t <sub>PHL</sub> |                 |             | 1   | 2.9 | 4.2 | 1   | 5   |      |
| t <sub>PZH</sub> | $\overline{OE}$ | Y           | 1.1   | 3.1 | 4.6 | 0.8 | 5.7 | ns   |
| t <sub>PZL</sub> |                 |             | 2.1   | 4.1 | 5.6 | 1.2 | 7.9 |      |
| t <sub>PHZ</sub> | $\overline{OE}$ | Y           | 2.1   | 4.1 | 5.6 | 1.2 | 7.6 | ns   |
| t <sub>PLZ</sub> |                 |             | 1.5   | 3.7 | 5.6 | 1   | 7.9 |      |

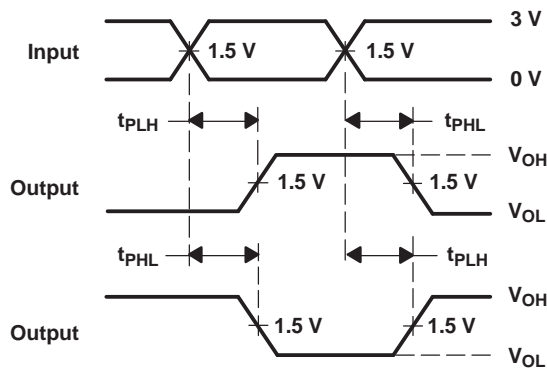
PARAMETER MEASUREMENT INFORMATION



LOAD CIRCUIT

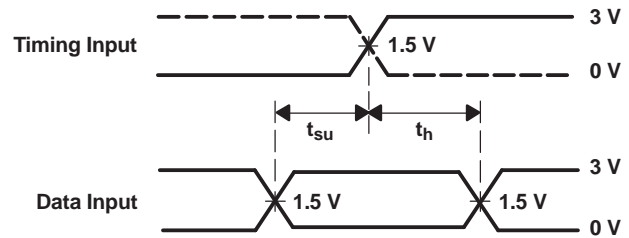


VOLTAGE WAVEFORMS  
PULSE DURATION

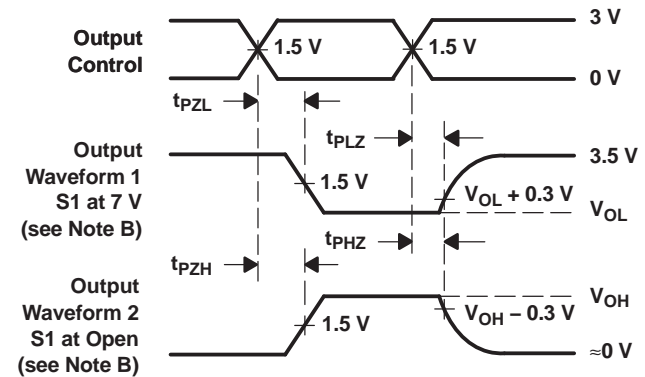


VOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES  
INVERTING AND NONINVERTING OUTPUTS

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



VOLTAGE WAVEFORMS  
SETUP AND HOLD TIMES



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  $\leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5 \text{ ns}$ ,  $t_f \leq 2.5 \text{ ns}$ .  
 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<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2) | Lead finish/<br>Ball material<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|-------------------|---------------|--------------|--------------------|------|----------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|-------------------------|
| SN74ABT244AMDBREP | ACTIVE        | SSOP         | DB                 | 20   | 2000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | ABT244AMEP              | <a href="#">Samples</a> |
| V62/06667-01XE    | ACTIVE        | SSOP         | DB                 | 20   | 2000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -55 to 125   | ABT244AMEP              | <a href="#">Samples</a> |

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

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

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

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

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

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

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

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

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

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

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

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

(6) Lead finish/Ball material - Orderable Devices 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.

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**OTHER QUALIFIED VERSIONS OF SN74ABT244A-EP :**

- Catalog: [SN74ABT244A](#)

## NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product

**TAPE AND REEL INFORMATION**

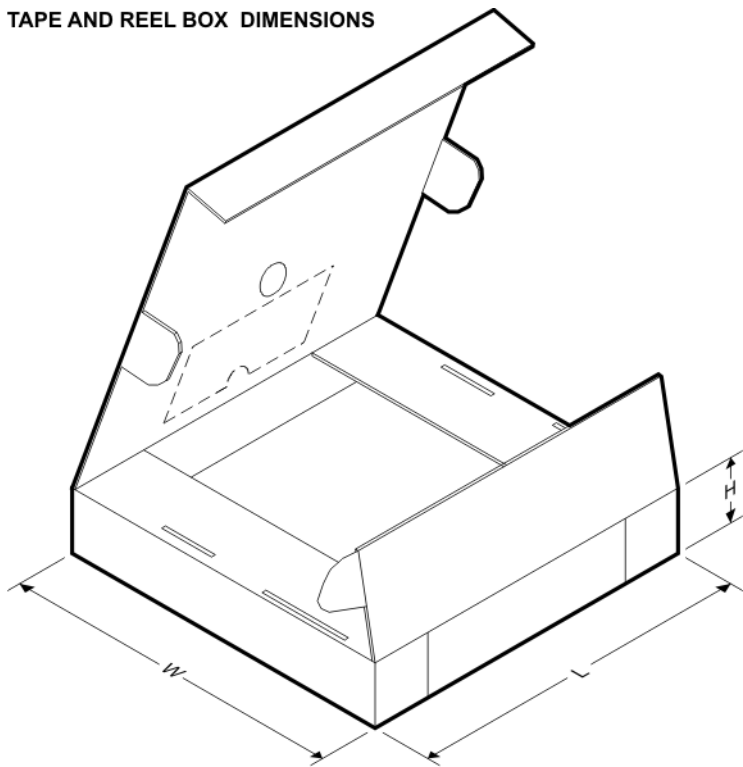
**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**


\*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 |
|-------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74ABT244AMDBREP | SSOP         | DB              | 20   | 2000 | 330.0              | 16.4               | 8.2     | 7.5     | 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) |
|-------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74ABT244AMDBREP | SSOP         | DB              | 20   | 2000 | 853.0       | 449.0      | 35.0        |

# DB0020A



# PACKAGE OUTLINE

## SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



4214851/B 08/2019

### 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-150.

# EXAMPLE BOARD LAYOUT

DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



4214851/B 08/2019

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.

# EXAMPLE STENCIL DESIGN

DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



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

4214851/B 08/2019

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.

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