SN54ABT125, SN74ABT125 QUADRUPLE BUS BUFFER GATES WITH 3-STATE OUTPUTS

SCBS182I - FEBRUARY 1997 - REVISED NOVEMBER 2002

- Typical VOLP (Output Ground Bounce) <1 V at V_{CC} = 5 V, T_A = 25°C
- High-Drive Outputs (-32-mA IOH, 64-mA IOL)
- Ioff and Power-Up 3-State Support Hot Insertion
- Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17
- **ESD Protection Exceeds JESD 22** – 2000-V Human-Body Model (A114-A) – 200-V Machine Model (A115-A)
- SN54ABT125 ... J OR W PACKAGE SN74ABT125 ... RGY PACKAGE SN54ABT125 . . . FK PACKAGE (TOP VIEW) (TOP VIEW) SN74ABT125 ... D, DB, N, NS, **OR PW PACKAGE** (TOP VIEW) √CC õ ç ŚĮĞ 10E V_{CC} 14 1 14 18 4A 1A 🛛 4OE 1Y 2 13 4OE 2 13 1A NC 5 17 NC 1Y 4A 12 3 12 1Y 3 4A 2OE 16 4Y 6 20E 4Y 4 11 2<mark>0E</mark> 4 11 4Y NC 15 NC Π7 2A [5 10 3OE 5 10 3OE 2Δ 2A 3OE 14 2Y 8 6 q _ 3A 2Y 6 C 3A 10 11 12 8 GND 3Y 7 8 後为養部世常 GND 2√ GND ANC 37 NC NC - No internal connection

description/ordering information

The 'ABT125 guadruple bus buffer gates feature independent line drivers with 3-state outputs. Each output is disabled when the associated output-enable (OE) input is high.

These devices are fully specified for hot-insertion applications using I_{off} and power-up 3-state. The I_{off} circuitry disables the outputs, preventing damaging current backflow through the devices when they are powered down. The power-up 3-state circuitry places the outputs in the high-impedance state during power up and power down, which prevents driver conflict.

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.

| TA | PACKAGE [†] | | ORDERABLE PART NUMBER | TOP-SIDE MARKING | | | | | |
|----------------|-------------------------|---------------|--------------------------|---------------------|--|--|--|--|--|
| | PDIP – N | Tube | SN74ABT125N | SN74ABT125N | | | | | |
| –40°C to 85°C | QFN – RGY | Tape and reel | SN74ABT125RGYR | AB125 | | | | | |
| | SOIC – D | Tube | SN74ABT125D | ABT125 | | | | | |
| | 30IC - D | Tape and reel | SN74ABT125DR | ABT125 | | | | | |
| | SOP – NS | Tape and reel | SN74ABT125NSR | ABT125 | | | | | |
| | SSOP – DB Tape and reel | | SN74ABT125DBR | AB125 | | | | | |
| | TSSOP – PW | Tape and reel | SN74ABT125PWR | AB125 | | | | | |
| | CDIP – J | Tube | SNJ54ABT125J | SNJ54ABT125J | | | | | |
| –55°C to 125°C | CFP – W | Tube | SNJ54ABT125W | SNJ54ABT125W | | | | | |
| | LCCC – FK | Tube | SNJ54ABT125FK | SNJ54ABT125FK | | | | | |

ORDERING INFORMATION

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



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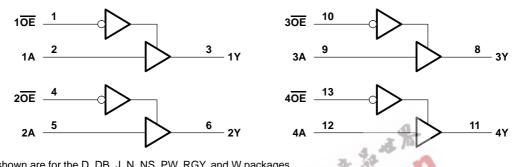
PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



Copyright © 2002. Texas Instruments Incorporated On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

| FUNCTION TABLE (each buffer) | | | | | | |
|---------------------------------|---|---|--|--|--|--|
| INPUTS OUTPUT | | | | | | |
| OE | Α | Y | | | | |
| L | Н | Н | | | | |
| L | L | L | | | | |
| Н | Х | Z | | | | |

logic diagram (positive logic)



Pin numbers shown are for the D, DB, J, N, NS, PW, RGY, and W packages.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

| Supply voltage range, V _{CC} | | –0.5 V to 7 V |
|--|--|-----------------|
| | ə 1) | |
| Voltage range applied to any out | put in the high or power-off state, VO | –0.5 V to 5.5 V |
| Current into any output in the low | v state, IO: SN54ABT125 | |
| | SN74ABT125 | 128 mA |
| Input clamp current, I_{IK} (V ₁ < 0) | | –18 mA |
| Output clamp current, IOK (VO < | 0) | |
| Package thermal impedance, $\theta_{\rm J}$ | A (see Note 2): D package | |
| | (see Note 2): DB package | |
| | (see Note 2): N package | 80°C/W |
| | (see Note 2): NS package | |
| | (see Note 2): PW package | 113°C/W |
| | (see Note 3): RGY package | 47°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 JESD 51-7.

3. The package thermal impedance is calculated in accordance with JESD 51-5.



recommended operating conditions (see Note 4)

| | | SN54ABT125 | | SN74A | BT125 | UNIT |
|----------------------------|------------------------------------|------------|-----|-------|-------|------|
| | | MIN | MAX | MIN | MAX | UNIT |
| VCC | Supply voltage | 4.5 | 5.5 | 4.5 | 5.5 | V |
| VIH | High-level input voltage | 2 | | 2 | | V |
| VIL | Low-level input voltage | | 0.8 | | 0.8 | V |
| VI | Input voltage | 0 | VCC | 0 | VCC | V |
| ЮН | High-level output current | | -24 | | -32 | mA |
| IOL | Low-level output current | | 48 | | 64 | mA |
| $\Delta t/\Delta v$ | Input transition rise or fall rate | | 10 | | 10 | 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 4: 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 | | ٦ | A = 25°C | ; | SN54A | BT125 | SN74A | BT125 | UNIT | |
|--------------------------|----------------|--|--|-------|----------|-------|------------|-------|-------|-------|------|--|
| | | TEST CONDITIONS | | | TYP† | MAX | MIN | MAX | MIN | MAX | UNIT | |
| VIK | | $V_{CC} = 4.5 \text{ V},$ $I_{I} = -18 \text{ mA}$ | | | | -1.2 | | -1.2 | | -1.2 | V | |
| V _{CC} = 4.5 V, | | V _{CC} = 4.5 V, | I _{OH} = –3 mA | 2.5 | | | 2.5 | | 2.5 | | | |
| Varia | | $V_{CC} = 5 V$, $I_{OH} = -3 mA$ | | 3 | | | 3 | | 3 | | v | |
| VOH | | V _{CC} = 4.5 V | I _{OH} = -24 mA | 2 | | | 2 | | | | V | |
| | | VCC = 4.5 V | I _{OH} = -32 mA | 2* | | | | | 2 | | | |
| Ve | | V _{CC} = 4.5 V | I _{OL} = 48 mA | | | 0.55 | | 0.55 | | | V | |
| VOL | | VCC = 4.5 V | I _{OL} = 64 mA | 0.55* | | | | | 0.55 | v | | |
| V _{hys} | | | | | 100 | | | | | | mV | |
| Ιį | | $V_{CC} = 0$ to 5.5 V, $V_I = V_{CC}$ or GND | | | | ±1 | | ±1 | | ±1 | μA | |
| IOZPU | | $V_{CC} = 0$ to 2.1 V, $V_O = 0.5$ V to 2.7 V, $\overline{OE} = X$ | | | | ±50 | | ±50 | | ±50 | μA | |
| IOZPD | | $V_{CC} = 2.1 \text{ V to } 0, V_O = 0.5 \text{ V to } 2.7 \text{ V}, \overline{OE} = X$ | | | | ±50 | | ±50 | | ±50 | μA | |
| IOZH | | $V_{CC} = 2.1 \text{ V to } 5.5 \text{ V}, \qquad V_{O} = 2.7 \text{ V}, \overline{OE} \ge 2 \text{ V}$ | | | | 10 | 0 | 10 | | 10 | μA | |
| IOZL | | $V_{CC} = 2.1 \text{ V to } 5.5 \text{ V}, \qquad V_{O} = 0.5 \text{ V}, \overline{\text{OE}} \ge 2 \text{ V}$ | | | | -10 | The second | -10 | | -10 | μA | |
| loff | | V _{CC} = 0, | $V_I \text{ or } V_O \leq 4.5 \text{ V}$ | | | ±100 | | | | ±100 | μA | |
| ICEX | | V _{CC} = 5.5 V, V _O = 5.5 V | Outputs high | . 3 | 3 | 50 | .C. | 50 | | 50 | μA | |
| 10‡ | | V _{CC} = 5.5 V, | V _O = 2.5 V | -50 | -100 | -200§ | -50 | –200§ | -50 | –200§ | mA | |
| | | V _{CC} = 5.5 V, | Outputs high | | G | 250 | | 250 | | 250 | μΑ | |
| ICC | | $I_{O} = 0,$ | Outputs low | | 24 | 30 | | 30 | | 30 | mA | |
| | | $V_I = V_{CC}$ or GND | Outputs disabled | | 0.5 | 250 | | 250 | | 250 | μA | |
| | Data | $V_{CC} = 5.5 V$, One input at 3.4 V, | Outputs enabled | | | 1.5 | | 1.5 | | 1.5 | | |
| ∆ICC [¶] | inputs | Other inputs at V _{CC} or GND | Outputs disabled | | | 0.05 | | 0.05 | | 0.05 | mA | |
| | Control inputs | V_{CC} = 5.5 V, One input at 3.4 V, Other inputs at V_{CC} or GND | | | | 1.5 | | 1.5 | | 1.5 | | |
| Ci | | VI = 2.5 V or 0.5 V | | | 3 | | | | | | pF | |
| Co | | Vo = 2.5 V or 0.5 V | | | 7 | | | | | | pF | |

* On products compliant to MIL-PRF-38535, this parameter does not apply.

[†] All typical values are at $V_{CC} = 5 V$.

[‡]Not more than one output should be tested at a time, and the duration of the test should not exceed one second.

§ This limit may vary among suppliers.

¶ 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 (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V ₍ Tj | CC = 5 V A = 25°C | , , | SN54A | BT125 | SN74A | BT125 | UNIT | |
|-------------------------------|-----------------|----------------|----------------------|----------------------|--------|-------|-------|-------|-------|------|--|
| | | (001F01) | | | | | MAX | MIN | MAX | | |
| ^t PLH [†] | ٨ | ٨ | v | 1 | 3.2 | 4.6 | 1 | 6 | 1 | 4.9 | |
| ^t PHL [†] | A | Ť | 1 | 2.5 | 4.6 | 1 | 6.2 | 1 | 4.9 | ns | |
| ^t PZH [†] | | V | 1 | 3.6 | 5 | 1 | 6 | 1 | 5.9 | | |
| ^t PZL [†] | OE | Ŷ | 1 | 2.5 | 6.2 | 1 | 7.5 | 1 | 6.8 | ns | |
| ^t PHZ | | | 1 | 3.8 | 5.4 | 1 | 6.3 | 1 | 6.2 | | |
| ^t PLZ [†] | ŌĒ | T | 1 | 3.3 | 5.3 | 1 | 6.5 | 1 | 6.2 | ns | |

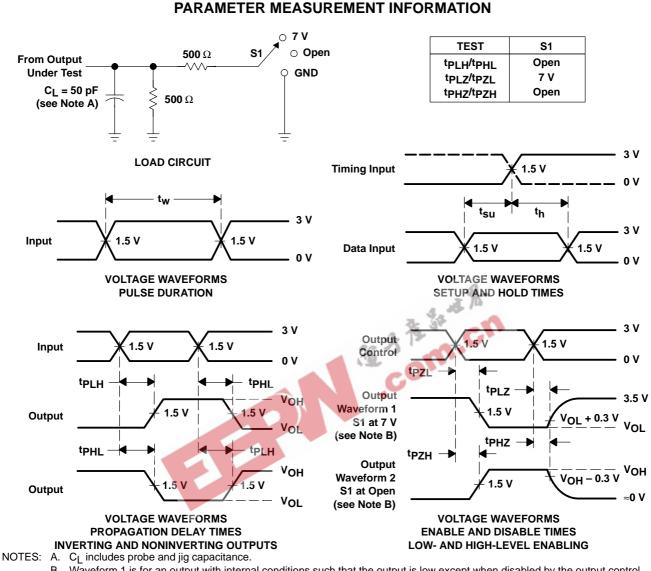
[†] This limit may vary among suppliers.





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- 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 MHz, Z_O = 50 Ω , t_f \leq 2.5 ns, t_f \leq 2.5 ns. D. The outputs are measured one at a time with one transition per measurement.
- E. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms





PACKAGE OPTION ADDENDUM

28-Feb-2005

PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|-----------------|--------------------|------|----------------|-------------------------|------------------|--|
| 5962-9676801Q2A | ACTIVE | LCCC | FK | 20 | 1 | None | Call TI | Level-NC-NC-NC |
| 5962-9676801QCA | ACTIVE | CDIP | J | 14 | 1 | None | Call TI | Level-NC-NC-NC |
| 5962-9676801QDA | ACTIVE | CFP | W | 14 | 1 | None | Call TI | Level-NC-NC-NC |
| SN74ABT125D | ACTIVE | SOIC | D | 14 | 50 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74ABT125DBLE | OBSOLETE | SSOP | DB | 14 | | None | Call TI | Call TI |
| SN74ABT125DBR | ACTIVE | SSOP | DB | 14 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74ABT125DR | ACTIVE | SOIC | D | 14 | 2500 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74ABT125N | ACTIVE | PDIP | Ν | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SN74ABT125NSR | ACTIVE | SO | NS | 14 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74ABT125PW | ACTIVE | TSSOP | PW | 14 | 90 | Pb-Free (RoHS) | CU NIPDAU | Level-1-250C-UNLIM |
| SN74ABT125PWLE | OBSOLETE | TSSOP | PW | 14 | ふや | None | Call TI | Call TI |
| SN74ABT125PWR | ACTIVE | TSSOP | PW | 14 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-1-250C-UNLIM |
| SN74ABT125RGYR | ACTIVE | QFN | RGY | 14 | 1000 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR |
| SNJ54ABT125FK | ACTIVE | LCCC | FK | 20 | 1 | None | Call TI | Level-NC-NC-NC |
| SNJ54ABT125J | ACTIVE | CDIP | J | 14 | 1 | None | Call TI | Level-NC-NC-NC |
| SNJ54ABT125W | ACTIVE | CFP | W | 14 | 1 | None | Call TI | Level-NC-NC-NC |

⁽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 - May not be currently available - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

None: Not yet available Lead (Pb-Free).

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.

Green (RoHS & no Sb/Br): TI defines "Green" to mean "Pb-Free" and in addition, uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

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

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PACKAGE OPTION ADDENDUM

28-Feb-2005

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

CERAMIC DUAL IN-LINE PACKAGE

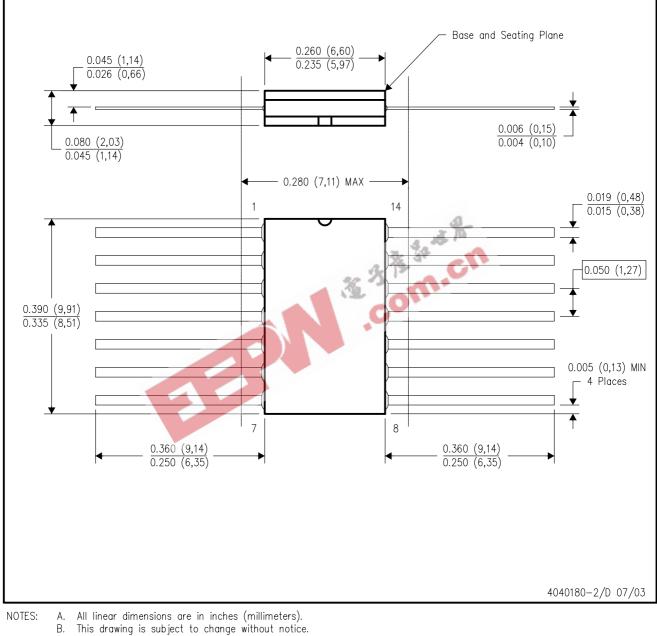
PINS ** 14 16 18 20 DIM 0.300 0.300 0.300 0.300 В А (7,62) (7,62) (7,62) (7,62) BSC BSC BSC BSC 8 14 0.785 1.060 .840 0.960 B MAX (19,94)(21, 34)(24, 38)(26, 92)B MIN С 0.300 0.300 0.310 0.300 C MAX (7, 62)(7,62) (7, 62)(7, 87)C MIN 7 0.245 0.245 0.220 0.245 0.065 (1,65) 0.045 (1,14) (6, 22)(6, 22)(5, 59)(6, 22)0.060 (1,52) - 0.005 (0,13) MIN Α -0.015 (0,38) 0.200 (5,08) MAX Seating Plane 0.130 (3,30) MIN 0.026 (0,66) 0.014 (0,36) 0°-15° 0.100 (2,54) 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



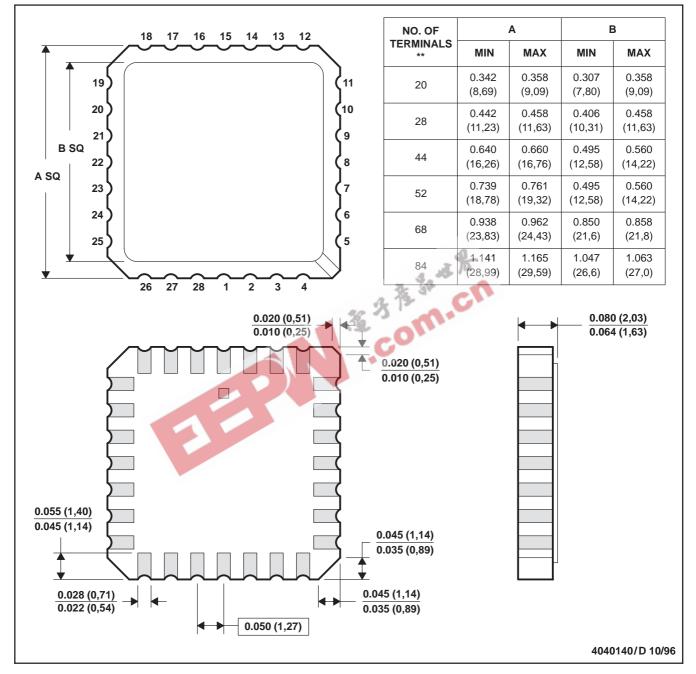
- C. This package can be hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only.
- E. Falls within MIL STD 1835 GDFP1-F14 and JEDEC MO-092AB



MLCC006B - OCTOBER 1996

LEADLESS CERAMIC CHIP CARRIER

FK (S-CQCC-N**) 28 TERMINAL SHOWN



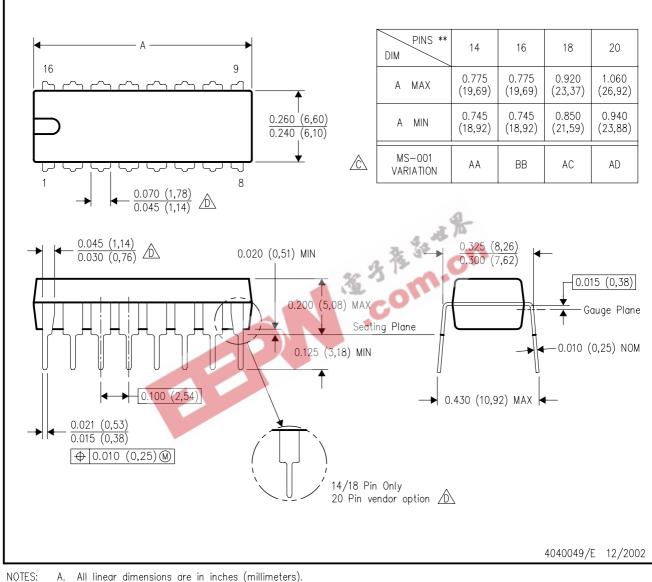
NOTES: A. All linear dimensions are in inches (millimeters).

- B. This drawing is subject to change without notice.
- C. This package can be hermetically sealed with a metal lid.
- D. The terminals are gold plated.
- E. Falls within JEDEC MS-004



PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



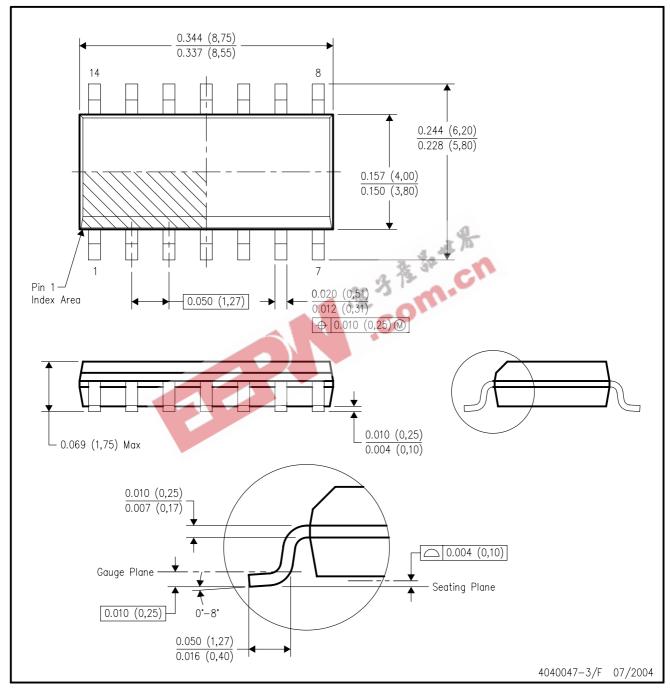
A. All linear dimensions are in inches (millimeters).B. This drawing is subject to change without notice.

- \triangle Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
- \triangle The 20 pin end lead shoulder width is a vendor option, either half or full width.



D (R-PDSO-G14)

PLASTIC SMALL-OUTLINE PACKAGE



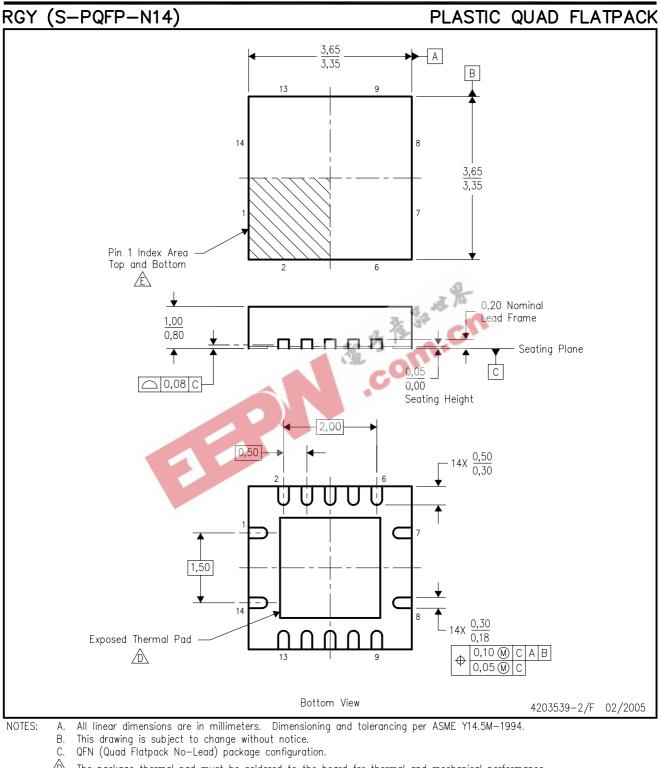
NOTES: A. All linear dimensions are in inches (millimeters).

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).

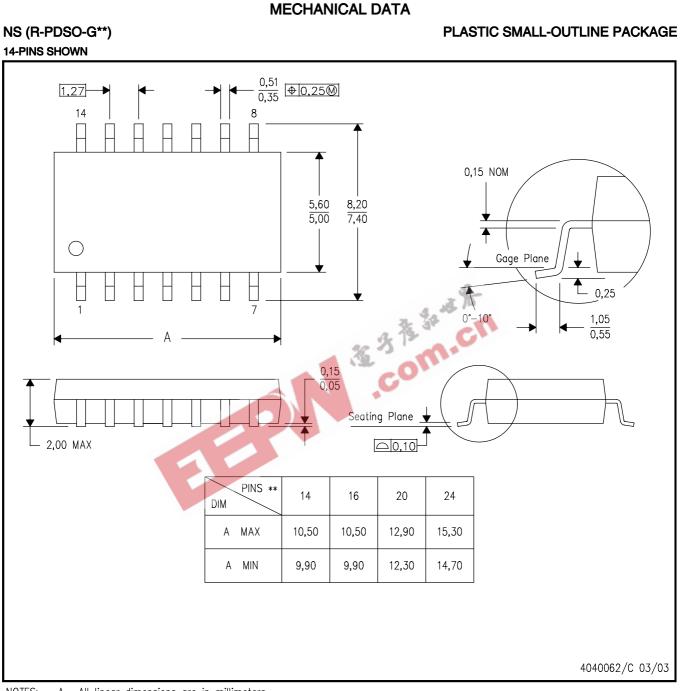
D. Falls within JEDEC MS-012 variation AB.





- The package thermal pad must be soldered to the board for thermal and mechanical performance. See the Product Data Sheet for details regarding the exposed thermal pad dimensions.
- Pin 1 identifiers are located on both top and bottom of the package and within the zone indicated. The Pin 1 identifiers are either a molded, marked, or metal feature.
- F. Package complies to JEDEC MO-241 variation BA.





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.

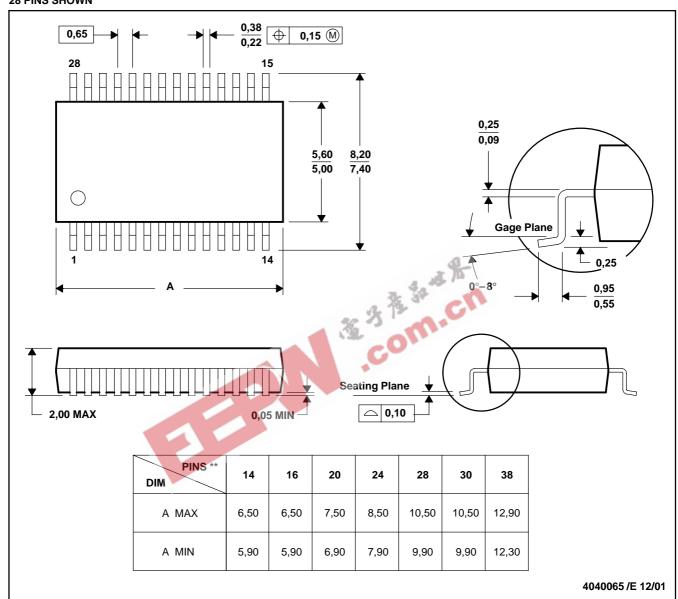


MSSO002E - JANUARY 1995 - REVISED DECEMBER 2001

PLASTIC SMALL-OUTLINE

28 PINS SHOWN

DB (R-PDSO-G**)



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.

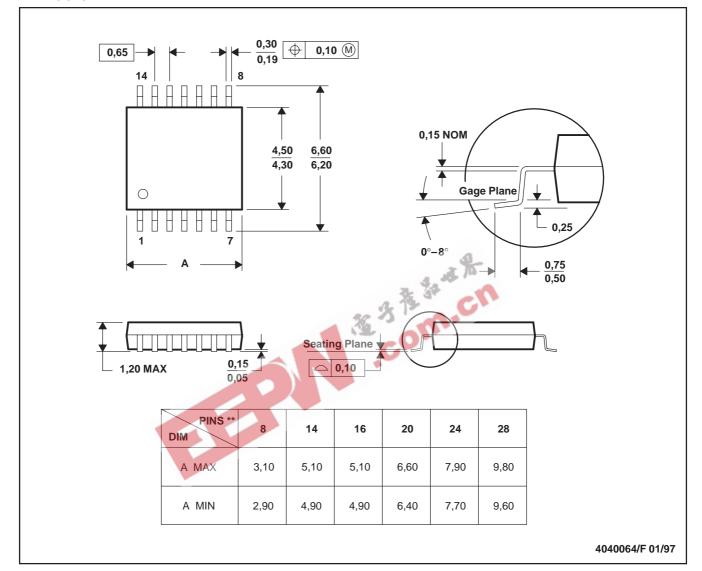
D. Falls within JEDEC MO-150



MTSS001C - JANUARY 1995 - REVISED FEBRUARY 1999

PLASTIC SMALL-OUTLINE PACKAGE





NOTES: A. All linear dimensions are in millimeters.

- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
- D. Falls within JEDEC MO-153



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