

SN74F126 QUADRUPLE BUS BUFFER GATE WITH 3-STATE OUTPUTS

SDFS017B – JANUARY 1989 – REVISED NOVEMBER 2002

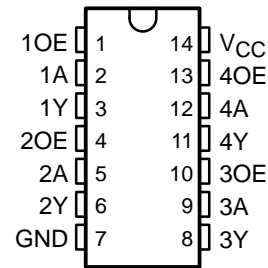
- 4.5-V to 5.5-V V_{CC} Operation
- Max t_{pd} of 6.5 ns at 5 V
- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers

description/ordering information

The SN74F126 bus buffer features independent line drivers with 3-state outputs. Each output is disabled when the associated output-enable (OE) input is low.

To ensure the high-impedance state during power up or power down, OE should be tied to GND through a pulldown resistor; the minimum value of the resistor is determined by the current-sourcing capability of the driver.

**D, N, OR NS PACKAGE
(TOP VIEW)**



ORDERING INFORMATION

| T_A | PACKAGE† | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|-------------|----------|---------------|-----------------------|------------------|
| 0°C to 70°C | PDIP – N | Tube | SN74F126N | SN74F126N |
| | SOIC – D | Tube | SN74F126D | F126 |
| | | Tape and reel | SN74F126DR | |
| | SOP – NS | Tape and reel | SN74F126NSR | 74F126 |

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

**FUNCTION TABLE
(each buffer)**

| INPUTS | | OUTPUT |
|--------|---|--------|
| OE | A | Y |
| H | H | H |
| H | L | L |
| L | X | Z |



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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.

 **TEXAS
INSTRUMENTS**

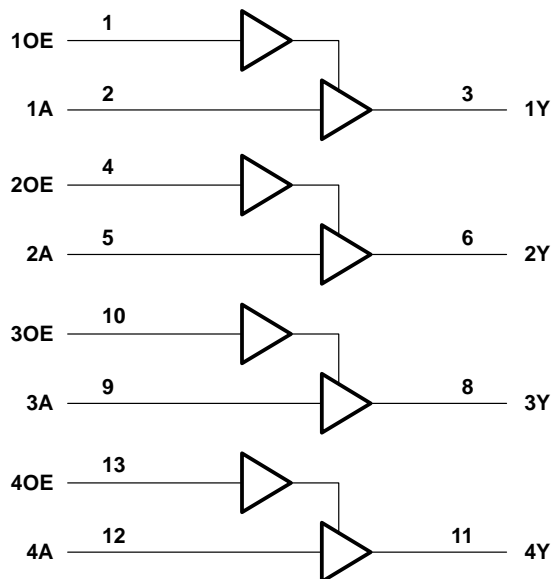
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logic diagram (positive logic)



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) | –1.2 V to 7 V |
| Input current range | –30 mA to 5 mA |
| Voltage range applied to any output in the disabled or power-off state | –0.5 V to 5.5 V |
| Voltage range applied to any output in the high state | –0.5 V to V_{CC} |
| Current into any output in the low state | 128 mA |
| Package thermal impedance, θ_{JA} (see Note 2): D package | 86°C/W |
| N package | 80°C/W |
| NS package | 76°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 voltage ratings may be exceeded provided the input current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions (see Note 3)

| | MIN | NOM | MAX | UNIT |
|--------------------------------------|-----|-----|-----|------|
| V_{CC} Supply voltage | 4.5 | 5 | 5.5 | V |
| V_{IH} High-level input voltage | 2 | | | V |
| V_{IL} Low-level input voltage | | | 0.8 | V |
| I_{IK} Input clamp current | | | –18 | mA |
| I_{OH} High-level output current | | | –15 | mA |
| I_{OL} Low-level output current | | | 64 | mA |
| T_A Operating free-air temperature | 0 | | 70 | °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.



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

| PARAMETER | TEST CONDITIONS | V _{CC} | MIN | TYP† | MAX | UNIT |
|-------------------|--------------------------|-----------------|------|------|------|------|
| V _{IK} | I _I = -18 mA | 4.5 V | | | -1.2 | V |
| V _{OH} | I _{OH} = -3 mA | 4.5 V | 2.4 | 3.3 | | V |
| | I _{OH} = -15 mA | | 2 | 3.1 | | |
| | I _{OH} = -3 mA | 4.75 V | 2.7 | | | |
| V _{OL} | I _{OL} = 64 mA | 4.5 V | 0.4 | 0.55 | | V |
| I _I | V _I = 7 V | 0 | | | 0.1 | mA |
| I _{IH} | V _I = 2.7 V | 5.5 V | | | 20 | μA |
| I _{IL} | V _I = 0.5 V | 5.5 V | | | -20 | μA |
| I _{OZH} | V _O = 2.7 V | 5.5V | | | 50 | μA |
| I _{OZL} | V _O = 0.5 V | 5.5 V | | | -50 | μA |
| I _{OS} ‡ | V _O = 0 | 5.5 V | -100 | | -225 | mA |
| I _{CCH} | Outputs open | 5.5 V | | 20 | 30 | mA |
| I _{CCL} | Outputs open | 5.5 V | | 32 | 48 | mA |
| I _{CCZ} | Outputs open | 5.5 V | | 26 | 39 | mA |

† 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 the duration of the short circuit should not exceed one second.

switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

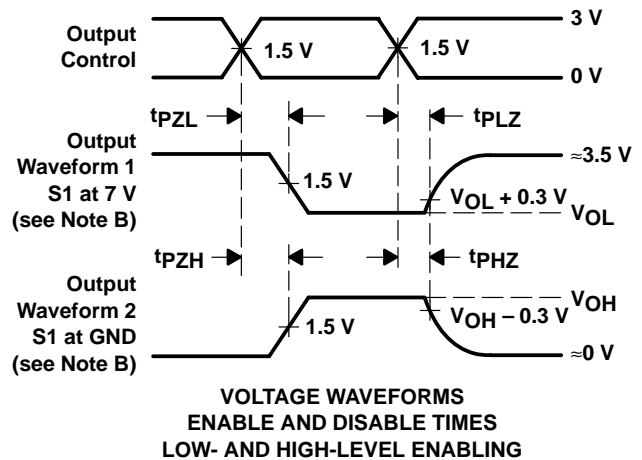
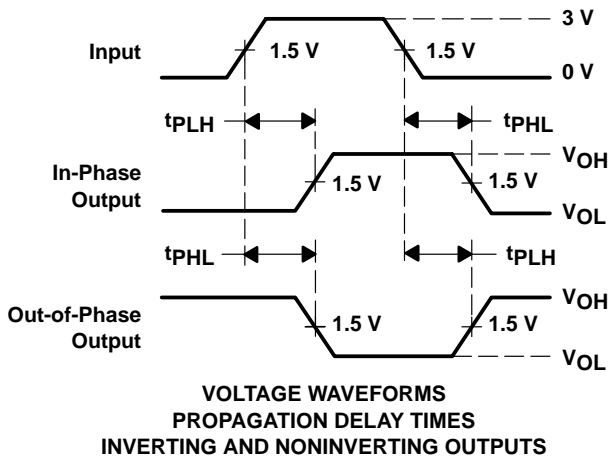
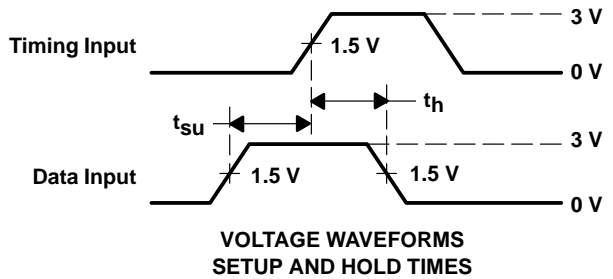
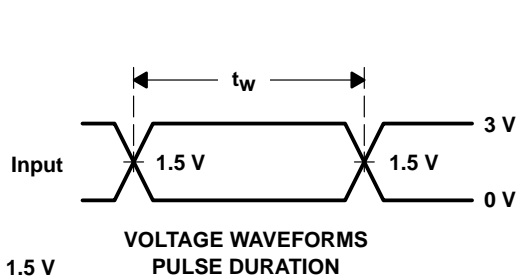
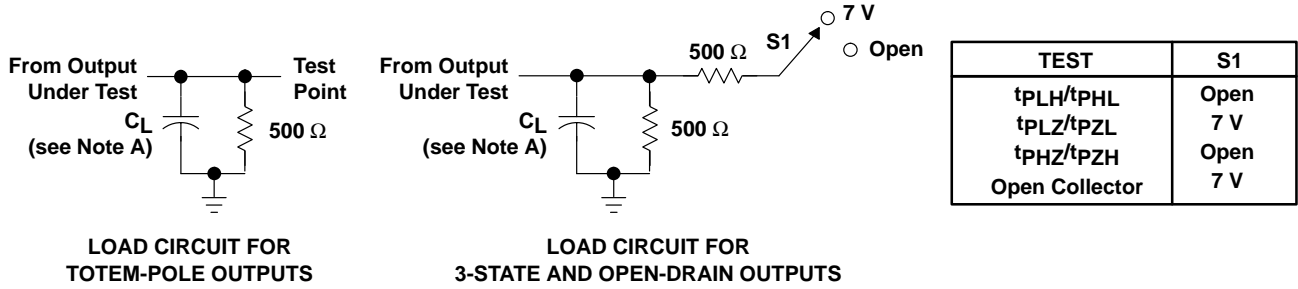
| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V _{CC} = 5 V, C _L = 50 pF, R _L = 500 Ω, T _A = 25°C | | | V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX§ | | UNIT |
|------------------|--------------|-------------|---|-----|-----|---|-----|------|
| | | | MIN | TYP | MAX | MIN | MAX | |
| t _{PLH} | A | Y | 2 | 4 | 6.5 | 2 | 7 | ns |
| t _{PHL} | | | 3 | 5.5 | 8 | 2.8 | 8.5 | |
| t _{PZH} | OE | Y | 3.8 | 6 | 7.5 | 3.3 | 8.5 | ns |
| t _{PZL} | | | 3.8 | 6 | 8 | 3.5 | 8.5 | |
| t _{PHZ} | OE | Y | 2 | 4.5 | 6.5 | 2 | 7.5 | ns |
| t _{PLZ} | | | 3 | 5.5 | 7.5 | 3 | 8 | |

§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

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PARAMETER MEASUREMENT INFORMATION



- NOTES:
- C_L includes probe and jig capacitance.
 - 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.
 - All input pulses are supplied by generators having the following characteristics: $PRR \leq 1\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 2.5\text{ ns}$, $t_f \leq 2.5\text{ ns}$, duty cycle = 50%.
 - The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| SN74F126D | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74F126DE4 | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74F126DG4 | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74F126DR | ACTIVE | SOIC | D | 14 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74F126DRE4 | ACTIVE | SOIC | D | 14 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74F126DRG4 | ACTIVE | SOIC | D | 14 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74F126N | ACTIVE | PDIP | N | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type |
| SN74F126NE4 | ACTIVE | PDIP | N | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type |
| SN74F126NSRE4 | ACTIVE | SO | NS | 14 | | TBD | Call TI | Call TI |
| SN74F126NSRG4 | ACTIVE | SO | NS | 14 | | TBD | Call TI | Call TI |

⁽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.

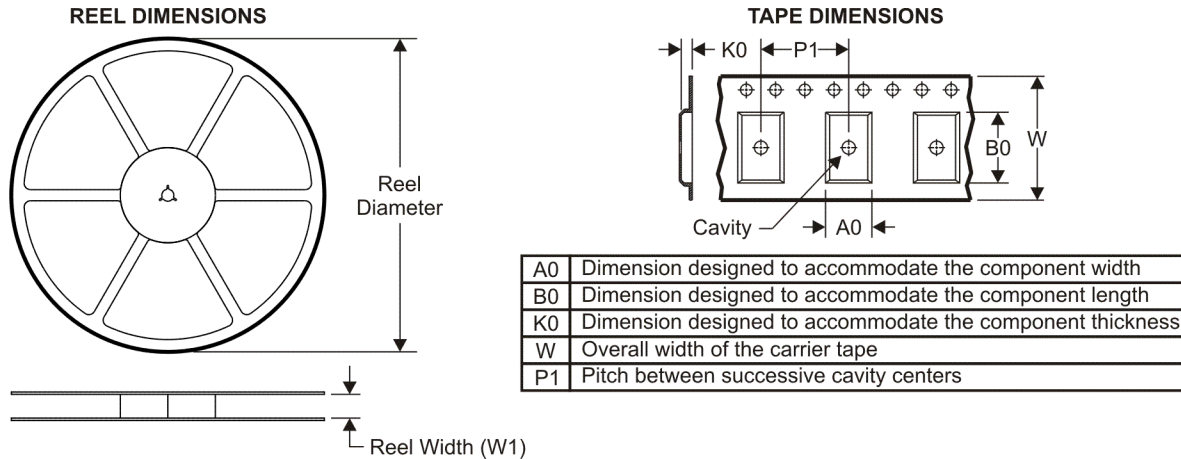
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

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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 |
|------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74F126DR | SOIC | D | 14 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 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) |
|------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74F126DR | SOIC | D | 14 | 2500 | 346.0 | 346.0 | 33.0 |

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

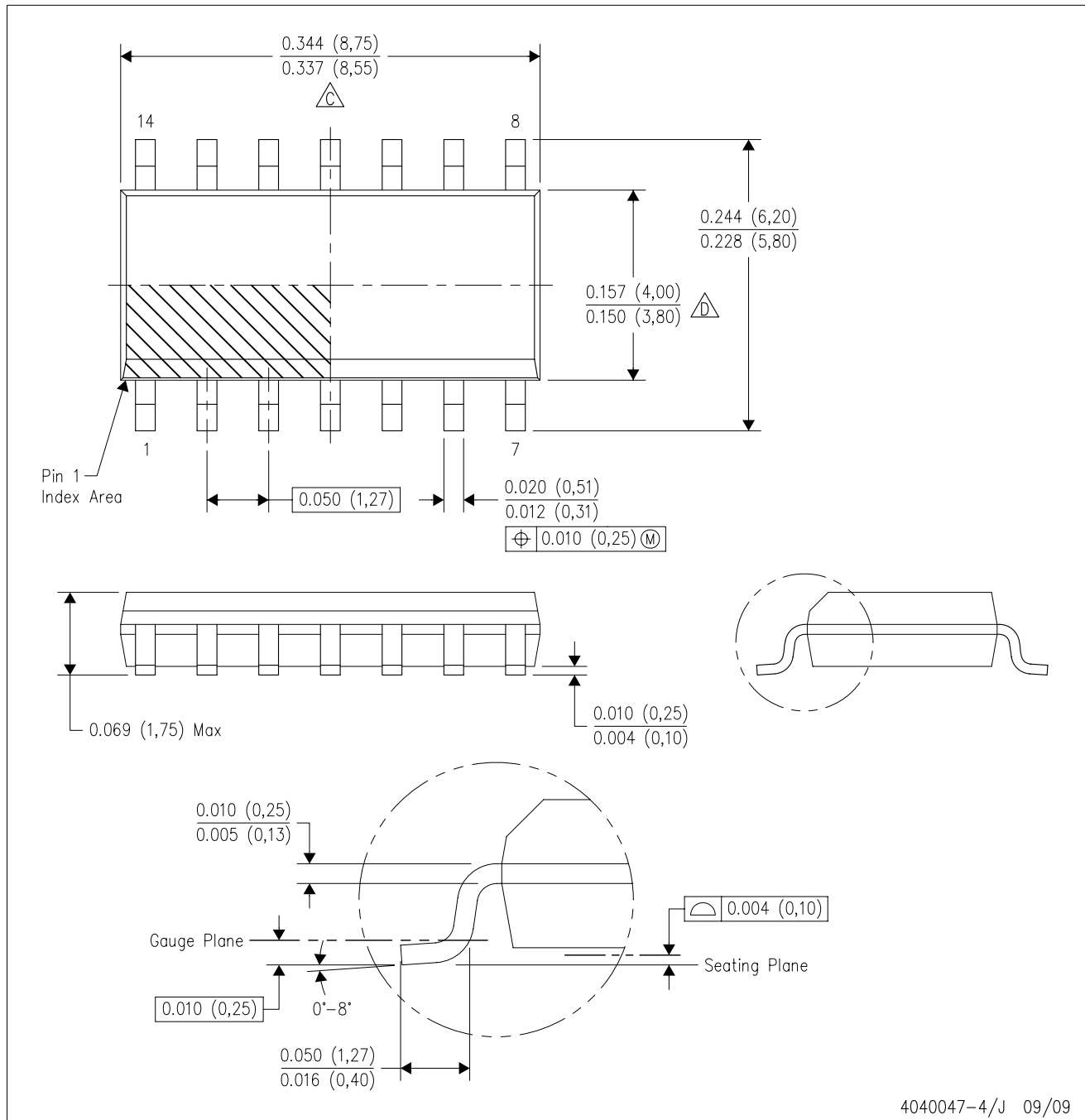
14-PINS SHOWN



- 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 (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 length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 (0,15) per end.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.
 - E. Reference JEDEC MS-012 variation AB.

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



4040049/E 12/2002

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