

# SN74F126 QUADRUPLE BUS BUFFER GATE WITH 3-STATE OUTPUTS

SDFS017B – JANUARY 1989 – REVISED NOVEMBER 2002

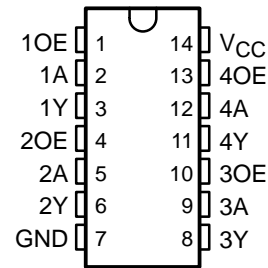
- 4.5-V to 5.5-V  $V_{CC}$  Operation
- Max  $t_{pd}$  of 6.5 ns at 5 V
- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers

## 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](http://www.ti.com/sc/package).

**FUNCTION TABLE  
(each buffer)**

| INPUTS |   | OUTPUT<br>Y |
|--------|---|-------------|
| OE     | A |             |
| H      | H | H           |
| H      | L | L           |
| L      | X | Z           |



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**TEXAS  
INSTRUMENTS**

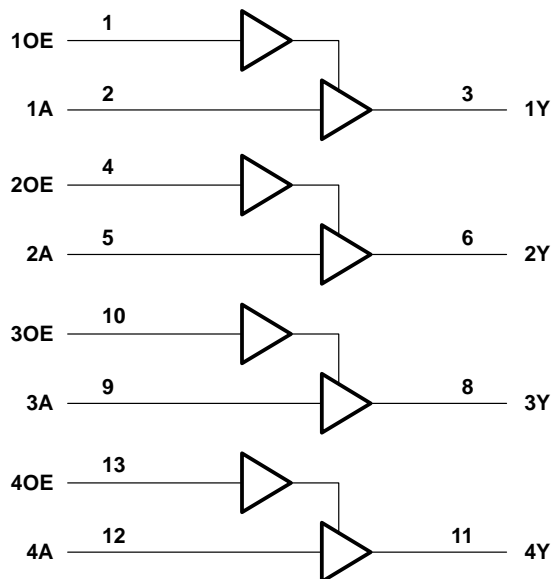
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## logic diagram (positive logic)



## 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, $\theta_{JA}$ (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 <sub>CC</sub> | MIN  | TYP† | MAX  | UNIT |
|-------------------|--------------------------|-----------------|------|------|------|------|
| V <sub>IK</sub>   | I <sub>I</sub> = -18 mA  | 4.5 V           |      |      | -1.2 | V    |
| V <sub>OH</sub>   | I <sub>OH</sub> = -3 mA  | 4.5 V           | 2.4  | 3.3  |      | V    |
|                   | I <sub>OH</sub> = -15 mA |                 | 2    | 3.1  |      |      |
|                   | I <sub>OH</sub> = -3 mA  | 4.75 V          | 2.7  |      |      |      |
| V <sub>OL</sub>   | I <sub>OL</sub> = 64 mA  | 4.5 V           | 0.4  | 0.55 |      | V    |
| I <sub>I</sub>    | V <sub>I</sub> = 7 V     | 0               |      |      | 0.1  | mA   |
| I <sub>IH</sub>   | V <sub>I</sub> = 2.7 V   | 5.5 V           |      |      | 20   | μA   |
| I <sub>IL</sub>   | V <sub>I</sub> = 0.5 V   | 5.5 V           |      |      | -20  | μA   |
| I <sub>OZH</sub>  | V <sub>O</sub> = 2.7 V   | 5.5V            |      |      | 50   | μA   |
| I <sub>OZL</sub>  | V <sub>O</sub> = 0.5 V   | 5.5 V           |      |      | -50  | μA   |
| I <sub>OS</sub> ‡ | V <sub>O</sub> = 0       | 5.5 V           | -100 |      | -225 | mA   |
| I <sub>CCH</sub>  | Outputs open             | 5.5 V           |      | 20   | 30   | mA   |
| I <sub>CCL</sub>  | Outputs open             | 5.5 V           |      | 32   | 48   | mA   |
| I <sub>CCZ</sub>  | Outputs open             | 5.5 V           |      | 26   | 39   | mA   |

† All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 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)**

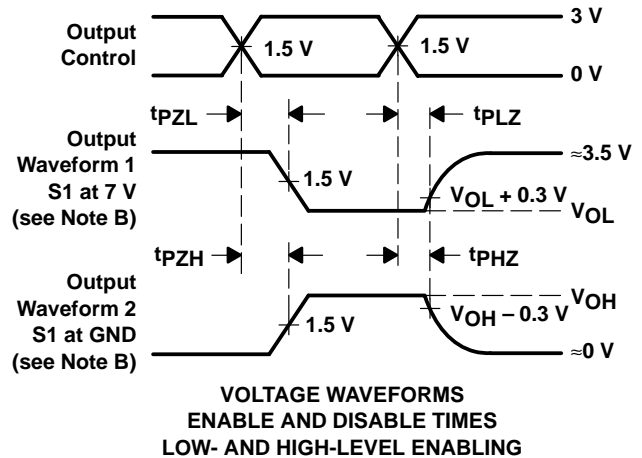
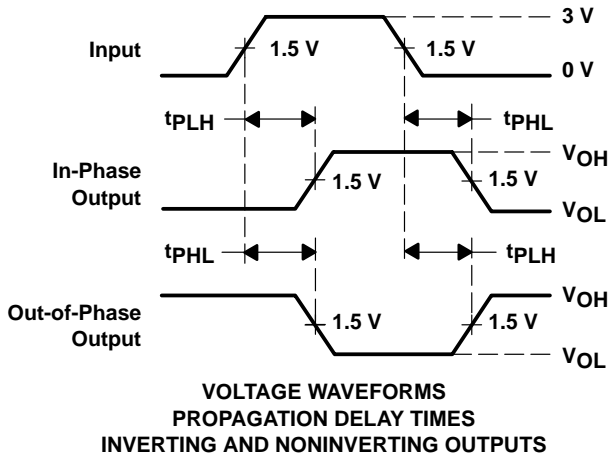
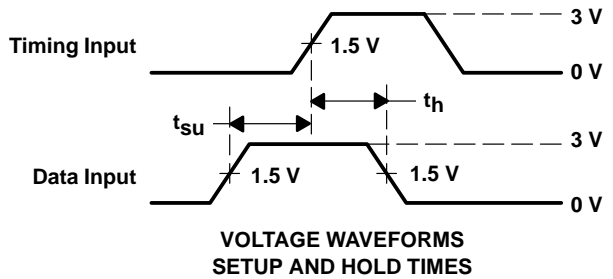
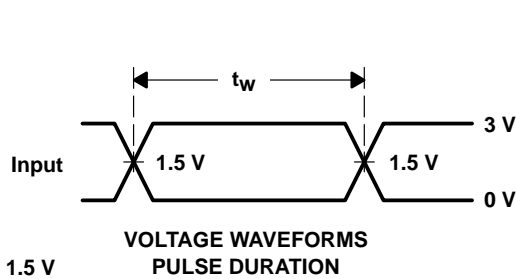
| PARAMETER        | FROM (INPUT) | TO (OUTPUT) | V <sub>CC</sub> = 5 V,<br>C <sub>L</sub> = 50 pF,<br>R <sub>L</sub> = 500 Ω,<br>T <sub>A</sub> = 25°C |     |     | V <sub>CC</sub> = 4.5 V to 5.5 V,<br>C <sub>L</sub> = 50 pF,<br>R <sub>L</sub> = 500 Ω,<br>T <sub>A</sub> = MIN to MAX§ |     | UNIT |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

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

# SN74F126 QUADRUPLE BUS BUFFER GATE WITH 3-STATE OUTPUTS

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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

**PACKAGING INFORMATION**

| Orderable Device | Status<br>(1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan<br>(2)         | Lead/Ball Finish<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|-----------------|------|-------------|-------------------------|-------------------------|----------------------|--------------|-------------------------|-------------------------|
| SN74F126D        | ACTIVE        | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | 0 to 70      | F126                    | <a href="#">Samples</a> |
| SN74F126DR       | ACTIVE        | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | 0 to 70      | F126                    | <a href="#">Samples</a> |
| SN74F126N        | ACTIVE        | PDIP         | N               | 14   | 25          | Green (RoHS & no Sb/Br) | NIPDAU                  | N / A for Pkg Type   | 0 to 70      | SN74F126N               | <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.

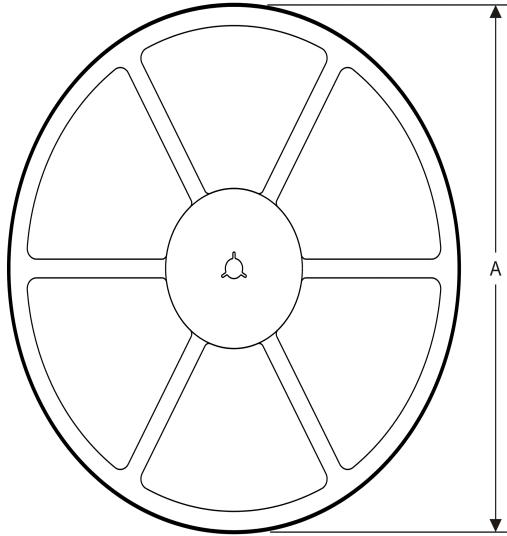
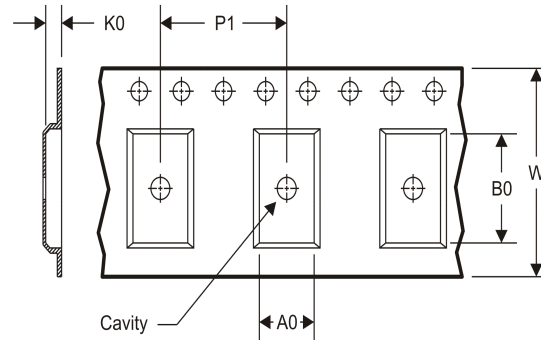
(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(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/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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**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                   |

**TAPE AND REEL INFORMATION**

\*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 | 367.0       | 367.0      | 38.0        |



D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  -  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  -  Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AB.

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - 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 for other stencil recommendations.
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



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

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