

# NL27WZ126

## Dual Buffer with 3-State Outputs

The NL27WZ126 is a high performance dual noninverting buffer operating from a 1.65 V to 5.5 V supply.

### Features

- Extremely High Speed:  $t_{PD}$  2.6 ns (typical) at  $V_{CC} = 5.0$  V
- Designed for 1.65 V to 5.5 V  $V_{CC}$  Operation
- Over Voltage Tolerant Inputs and Outputs
- LVTTL Compatible – Interface Capability With 5.0 V TTL Logic with  $V_{CC} = 3.0$  V
- LVC MOS Compatible
- 24 mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- 3-State OE Input is Active-High
- Replacement for NC7WZ126
- Chip Complexity = 72 FETs
- Pb-Free Package is Available

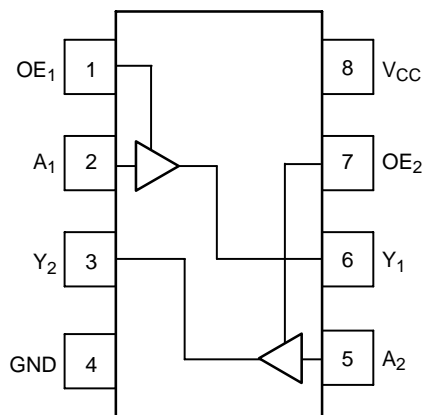


Figure 1. Pinout (Top View)

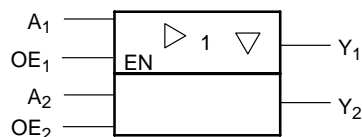
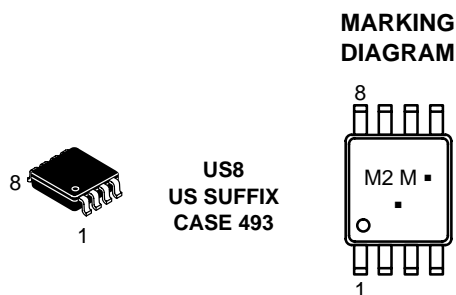


Figure 2. Logic Symbol



ON Semiconductor®

<http://onsemi.com>



M2 = Device Code  
M = Date Code\*  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation may vary depending upon manufacturing location.

### PIN ASSIGNMENT

| Pin | Function        |
|-----|-----------------|
| 1   | OE              |
| 2   | A <sub>1</sub>  |
| 3   | Y <sub>2</sub>  |
| 4   | GND             |
| 5   | A <sub>2</sub>  |
| 6   | Y <sub>1</sub>  |
| 7   | OE <sub>2</sub> |
| 8   | V <sub>CC</sub> |

### FUNCTION TABLE

| Input           |                | Output         |
|-----------------|----------------|----------------|
| OE <sub>n</sub> | A <sub>n</sub> | Y <sub>n</sub> |
| H               | H              | H              |
| H               | L              | L              |
| L               | X              | Z              |

X = Don't Care  
n = 1, 2

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

**MAXIMUM RATINGS**

| Symbol           | Parameter   | Value                  | Unit |
|------------------|---|------------------------|------|
| V <sub>CC</sub>  | DC Supply Voltage   | -0.5 to +7.0           | V    |
| V <sub>I</sub>   | DC Input Voltage  | -0.5 to +7.0           | V    |
| V <sub>O</sub>   | DC Output Voltage   | -0.5 to +7.0           | V    |
| I <sub>IK</sub>  | DC Input Diode Current<br>V <sub>I</sub> < GND  | -50                    | mA   |
| I <sub>OK</sub>  | DC Output Diode Current<br>V <sub>O</sub> < GND   | -50                    | mA   |
| I <sub>O</sub>   | DC Output Sink Current  | ±50                    | mA   |
| I <sub>CC</sub>  | DC Supply Current per Supply Pin  | ±100                   | mA   |
| I <sub>GND</sub> | DC Ground Current per Ground Pin  | ±100                   | mA   |
| T <sub>STG</sub> | Storage Temperature Range   | -65 to +150            | °C   |
| T <sub>L</sub>   | Lead Temperature, 1 mm from Case for 10 Seconds   | 260                    | °C   |
| T <sub>J</sub>   | Junction Temperature under Bias   | +150                   | °C   |
| θ <sub>JA</sub>  | Thermal Resistance (Note 1)   | 250                    | °C/W |
| P <sub>D</sub>   | Power Dissipation in Still Air at 85°C  | 250                    | mW   |
| MSL              | Moisture Sensitivity  | Level 1                |      |
| F <sub>R</sub>   | Flammability Rating<br>Oxygen Index: 28 to 34   | UL 94 V-0 @ 0.125 in   |      |
| V <sub>ESD</sub> | ESD Withstand Voltage<br>Human Body Model (Note 2)<br>Machine Model (Note 3)<br>Charged Device Model (Note 4) | > 2000<br>> 200<br>N/A | V    |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2-ounce copper trace with no air flow.
2. Tested to EIA/JESD22-A114-A.
3. Tested to EIA/JESD22-A115-A.
4. Tested to JESD22-C101-A.

**RECOMMENDED OPERATING CONDITIONS**

| Symbol          | Parameter   | Min         | Max           | Unit |
|-----------------|---|-------------|---------------|------|
| V <sub>CC</sub> | Supply Voltage<br>Operating<br>Data Retention Only  | 1.65<br>1.5 | 5.5<br>5.5    | V    |
| V <sub>I</sub>  | Input Voltage<br>(Note 5)   | 0           | 5.5           | V    |
| V <sub>O</sub>  | Output Voltage<br>(HIGH or LOW State)   | 0           | 5.5           | V    |
| T <sub>A</sub>  | Operating Free-Air Temperature  | -40         | +85           | °C   |
| Δt/ΔV           | Input Transition Rise or Fall Rate<br>V <sub>CC</sub> = 2.5 V ± 0.2 V<br>V <sub>CC</sub> = 3.0 V ± 0.3 V<br>V <sub>CC</sub> = 5.0 V ± 0.5 V | 0<br>0<br>0 | 20<br>10<br>5 | ns/V |

5. Unused inputs may not be left open. All inputs must be tied to a high- or low-logic input voltage level.

# NL27WZ126

## DC ELECTRICAL CHARACTERISTICS

| Symbol           | Parameter  | Condition   | V <sub>CC</sub><br>(V)                          | T <sub>A</sub> = 25°C                                    |  |  | -40°C ≤ T <sub>A</sub> ≤ 85°C                            |  | Unit |
|------------------|--|---|---|--|--|--|--|--|------|
|                  |  |   |   | Min  | Typ  | Max                                      | Min  | Max                                      |      |
| V <sub>IH</sub>  | High-Level Input Voltage   |   | 1.65 to 5.5                                     | 0.7 V <sub>CC</sub>                                      |  |  | 0.7 V <sub>CC</sub>                                      |  | V    |
| V <sub>IL</sub>  | Low-Level Input Voltage  |   | 1.65 to 5.5                                     |  |  | 0.3 V <sub>CC</sub>                      |  | 0.3 V <sub>CC</sub>                      | V    |
| V <sub>OH</sub>  | High-Level Output Voltage<br>V <sub>IN</sub> = V <sub>IH</sub>                   | I <sub>OH</sub> = 100 μA<br>I <sub>OH</sub> = -8 mA<br>I <sub>OH</sub> = -12 mA<br>I <sub>OH</sub> = -16 mA<br>I <sub>OH</sub> = -24 mA<br>I <sub>OH</sub> = -32 mA | 1.65 to 5.5<br>1.65<br>2.7<br>3.0<br>3.0<br>4.5 | V <sub>CC</sub> - 0.1<br>1.9<br>2.2<br>2.4<br>2.7<br>3.8 | V <sub>CC</sub><br>2.1<br>2.4<br>2.7<br>2.5<br>4.0 |  | V <sub>CC</sub> - 0.1<br>1.9<br>2.2<br>2.4<br>2.3<br>3.8 |  | V    |
| V <sub>OL</sub>  | Low-Level Output Voltage<br>V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> | I <sub>OL</sub> = 100 μA<br>I <sub>OL</sub> = 8 mA<br>I <sub>OL</sub> = 12 mA<br>I <sub>OL</sub> = 16 mA<br>I <sub>OL</sub> = 24 mA<br>I <sub>OL</sub> = 32 mA      | 1.65 to 5.5<br>1.65<br>2.7<br>3.0<br>3.0<br>4.5 |  | 0.20<br>0.22<br>0.28<br>0.38<br>0.42               | 0.1<br>0.3<br>0.4<br>0.4<br>0.55<br>0.55 |  | 0.1<br>0.3<br>0.4<br>0.4<br>0.55<br>0.55 | V    |
| I <sub>IN</sub>  | Input Leakage Current  | V <sub>IN</sub> = V <sub>CC</sub> or GND  | 0 to 5.5  |  |  | ±0.1                                     |  | ±1.0                                     | μA   |
| I <sub>OFF</sub> | Power Off-Output Leakage Current   | V <sub>OUT</sub> = 5.5 V  | 0   |  |  | 1  |  | 10                                       | μA   |
| I <sub>CC</sub>  | Quiescent Supply Current   | V <sub>IN</sub> = V <sub>CC</sub> or GND  | 5.5   |  |  | 1  |  | 10                                       | μA   |
| I <sub>OZ</sub>  | 3-State Output Leakage   | V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>0 V ≤ V <sub>OUT</sub> ≤ 5.5 V  | 1.65 to 5.5                                     |  |  | ±0.5                                     |  | ±5                                       | μA   |

## AC ELECTRICAL CHARACTERISTICS (t<sub>R</sub> = t<sub>F</sub> = 3.0 ns)

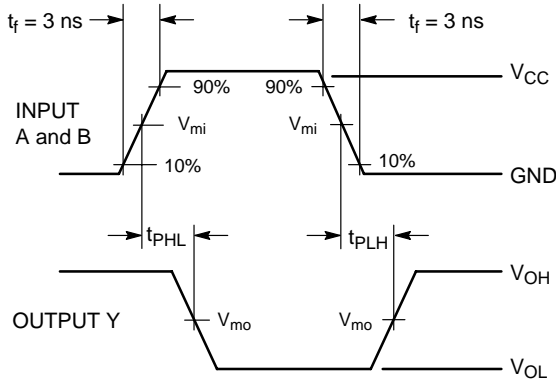
| Symbol                                 | Parameter  | Condition  | V <sub>CC</sub><br>(V) | T <sub>A</sub> = 25°C |     |     | -40°C ≤ T <sub>A</sub> ≤ 85°C |     | Unit |
|--|--|--|------------------------|-----------------------|-----|-----|-------------------------------|-----|------|
|  |  |  |                        | Min                   | Typ | Max | Min                           | Max |      |
| t <sub>PLH</sub><br>t <sub>PHL</sub>   | Propagation Delay<br>AN to YN<br>(Figures 3 and 4,<br>Table 1) | R <sub>L</sub> = 1 MΩ C <sub>L</sub> = 15 pF         | 1.8 ± 0.15             | 2.0                   |     | 12  | 2.0                           | 13  | ns   |
|  |  |  | 2.5 ± 0.2              | 1.0                   |     | 7.5 | 1.0                           | 8   |      |
|  |  | R <sub>L</sub> = 1 MΩ C <sub>L</sub> = 15 pF         | 3.3 ± 0.3              | 0.8                   |     | 5.2 | 0.8                           | 5.5 |      |
|  |  | R <sub>L</sub> = 500 Ω C <sub>L</sub> = 50 pF        |                        | 1.2                   |     | 5.7 | 1.2                           | 6.0 |      |
|  |  | R <sub>L</sub> = 1 MΩ C <sub>L</sub> = 15 pF         | 5.0 ± 0.5              | 0.5                   |     | 4.5 | 0.5                           | 4.8 |      |
| t <sub>OSLH</sub><br>t <sub>OSSL</sub> | Output to Output Skew<br>(Note 6)                              | R <sub>L</sub> = 500 Ω C <sub>L</sub> = 50 pF        | 3.3 ± 0.3              |                       |     | 1.0 |                               | 1.0 | ns   |
|  |  | R <sub>L</sub> = 500 Ω C <sub>L</sub> = 50 pF        | 5.0 ± 0.5              |                       |     | 0.8 |                               | 0.8 |      |
| t <sub>PZH</sub><br>t <sub>PZL</sub>   | Output Enable Time<br>(Figures 5, 6 and 7,<br>Table 1)         | R <sub>L</sub> = 250 Ω C <sub>L</sub> = 50 pF        | 1.8 ± 0.15             | 3.0                   |     | 14  | 3.0                           | 15  | ns   |
|  |  |  | 2.5 ± 0.2              | 1.8                   |     | 8.5 | 1.8                           | 9.0 |      |
|  |  |  | 3.3 ± 0.3              | 1.2                   |     | 6.2 | 1.2                           | 6.5 |      |
| t <sub>PHZ</sub><br>t <sub>PLZ</sub>   | Output Enable Time<br>(Figures 5, 6 and 7,<br>Table 1)         | R <sub>L</sub> and R1 = 500 Ω C <sub>L</sub> = 50 pF | 1.8 ± 0.15             | 2.5                   |     | 12  | 2.5                           | 13  | ns   |
|  |  |  | 2.5 ± 0.2              | 1.5                   |     | 8.0 | 1.5                           | 8.5 |      |
|  |  |  | 3.3 ± 0.3              | 0.8                   |     | 5.7 | 0.8                           | 6.0 |      |
|  |  |  | 5.0 ± 0.5              | 0.3                   |     | 4.7 | 0.3                           | 5.0 |      |

6. Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. This specification applies to any outputs switching in the same direction, either HIGH-to-LOW (t<sub>OSSL</sub>) or LOW-to-HIGH (t<sub>OSLH</sub>); parameter guaranteed by design.

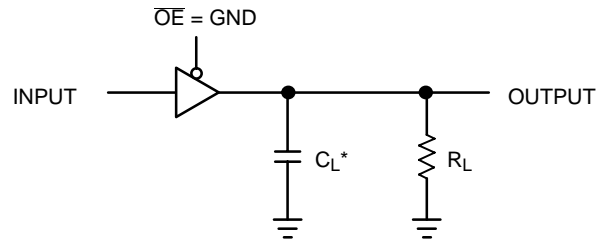
**CAPACITIVE CHARACTERISTICS**

| Symbol           | Parameter                                 | Condition  | Typical | Unit |
|------------------|---|--|---------|------|
| C <sub>IN</sub>  | Input Capacitance                         | V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0 V or V <sub>CC</sub>         | 2.5     | pF   |
| C <sub>OUT</sub> | Output Capacitance                        | V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0 V or V <sub>CC</sub>         | 2.5     | pF   |
| C <sub>PD</sub>  | Power Dissipation Capacitance<br>(Note 7) | 10 MHz, V <sub>CC</sub> = 3.3 V, V <sub>I</sub> = 0 V or V <sub>CC</sub> | 9       | pF   |
|                  |   | 10 MHz, V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0 V or V <sub>CC</sub> | 11      |      |

7. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: I<sub>CC(OPR)</sub> = C<sub>PD</sub> • V<sub>CC</sub> • f<sub>in</sub> + I<sub>CC</sub>. C<sub>PD</sub> is used to determine the no-load dynamic power consumption; P<sub>D</sub> = C<sub>PD</sub> • V<sub>CC</sub><sup>2</sup> • f<sub>in</sub> + I<sub>CC</sub> • V<sub>CC</sub>.

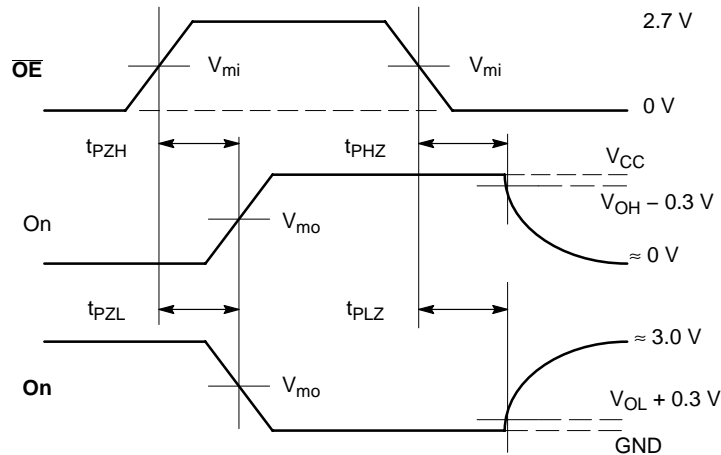


**Figure 3. Switching Waveform**



\*Includes all probe and jig capacitance.  
A 1 MHz square input wave is recommended for propagation delay tests.

**Figure 4. t<sub>PLH</sub> or t<sub>PHL</sub>**



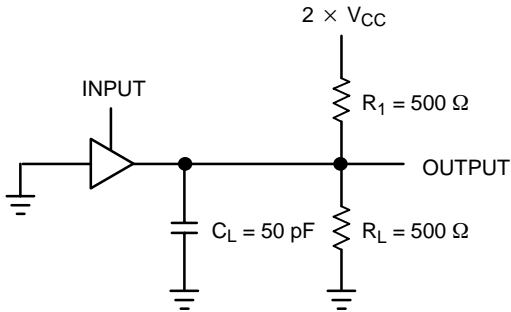
**Figure 5. AC Output Enable and Disable Waveform**

# NL27WZ126

**Table 1. Output Enable and Disable Times**

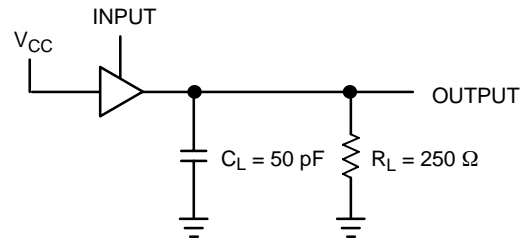
$t_R = t_F = 2.5 \text{ ns}$ , 10% to 90%;  $f = 1 \text{ MHz}$ ;  $t_W = 500 \text{ nsv}$

| Symbol   | $V_{CC}$                          |                 |                                   |
|----------|-----------------------------------|-----------------|-----------------------------------|
|          | $3.3 \text{ V} \pm 0.3 \text{ V}$ | $2.7 \text{ V}$ | $2.5 \text{ V} \pm 0.2 \text{ V}$ |
| $V_{mi}$ | 1.5 V                             | 1.5 V           | $V_{CC}/2$                        |
| $V_{mo}$ | 1.5 V                             | 1.5 V           | $V_{CC}/2$                        |



A 1 MHz square input wave is recommended for propagation delay tests.

**Figure 6.  $t_{PZL}$  or  $t_{PLZ}$**



A 1 MHz square input wave is recommended for propagation delay tests.

**Figure 7.  $t_{PZH}$  or  $t_{PHZ}$**

## DEVICE ORDERING INFORMATION

| Device Order Number | Device Nomenclature     |                          |                       |            |                 |                | Package Type  | Tape and Reel Size† |
|---------------------|-------------------------|--------------------------|-----------------------|------------|-----------------|----------------|---------------|---------------------|
|                     | Logic Circuit Indicator | No. of Gates per Package | Temp Range Identifier | Technology | Device Function | Package Suffix |               |                     |
| NL27WZ126US         | NL                      | 2                        | 7                     | WZ         | 126             | US             | US8           | 178 mm, 3000 Units  |
| NL27WZ126USG        | NL                      | 2                        | 7                     | WZ         | 126             | USG            | US8 (Pb-Free) | 178 mm, 3000 Units  |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

**NL27WZ126**

**PACKAGE DIMENSIONS**

**US8**  
**US SUFFIX**  
CASE 493-02  
ISSUE B