

SN74LVC126A Quadruple Bus Buffer Gate With 3-State Outputs

1 Features

- Operates from 1.65V to 3.6V
- Specified from -40°C to $+125^{\circ}\text{C}$
- Inputs accept voltages up to 5.5V
- Maximum t_{pd} of 4.7ns at 3.3V
- Typical V_{OLP} (output ground bounce), $<0.8\text{V}$ at $V_{CC} = 3.3\text{V}$, $T_A = 25^{\circ}\text{C}$
- Typical V_{OHV} (output V_{OH} undershoot), $>2\text{V}$ at $V_{CC} = 3.3\text{V}$, $T_A = 25^{\circ}\text{C}$
- Latch-up performance exceeds 250mA per JESD 17

2 Applications

- AV Receivers
- Audio Docks: Portable
- Blu-ray Players and Home Theaters
- MP3 Players or Recorders
- Personal Digital Assistants (PDAs)
- Power: Telecom, Server, and AC-DC Supplies (Single-Controller, Analog, and Digital)
- Solid State Drives (SSDs): Client and Enterprise
- TVs: LCD, Digital, and High-Definition (HDTV)
- Tablets: Enterprise
- Video Analytics: Server
- Wireless Headsets, Keyboards, and Mice

3 Description

The SN74LVC126A device is a quadruple bus buffer gate designed for 1.65V to 3.6V V_{CC} operation.

The SN74LVC126A device features independent line drivers with 3-state outputs. Each output is disabled when the associated output-enable (OE) input is low.

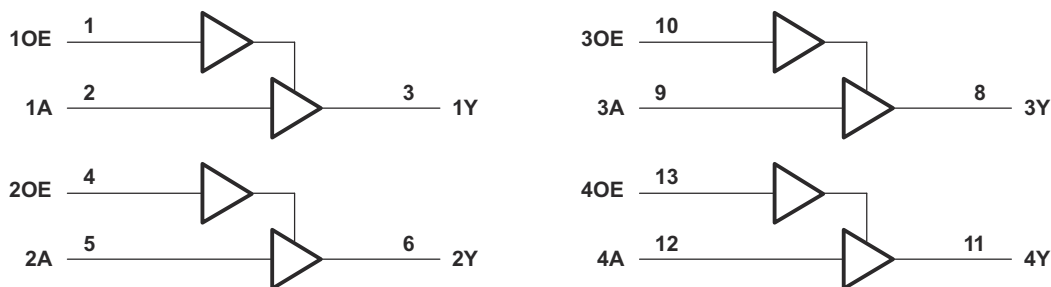
To ensure the high-impedance state during power up or power down, OE must be tied to GND through a pulldown resistor; the minimum value of the resistor is determined by the current-sourcing capability of the driver.

Inputs can be driven from either 3.3V or 5V devices. This feature allows the use of this device as a translator in a mixed 3.3V and 5V system environment.

Package Information

| PART NUMBER | PACKAGE ⁽¹⁾ | PACKAGE SIZE ⁽²⁾ | BODY SIZE ⁽³⁾ |
|-------------|------------------------|-----------------------------|--------------------------|
| SN74LVC126A | BQA (WQFN, 14) | 3mm × 2.5mm | 3mm × 2.5mm |
| | D (SOIC, 14) | 8.65mm × 6mm | 8.65mm × 3.91mm |
| | DB (SSOP, 14) | 6.2mm × 7.8mm | 6.20mm × 5.30mm |
| | DGV (TVSOP, 14) | 3.60mm × 6.4mm | 3.60mm × 4.40mm |
| | NS (SOP, 14) | 10.2mm × 7.8mm | 10.20mm × 5.30mm |
| | PW (TSSOP, 14) | 5mm × 6.4mm | 5.00mm × 4.40mm |
| | RGY (VQFN, 14) | 3.50mm × 3.50mm | 3.50mm × 3.50mm |

- For more information, see [Mechanical, Packaging, and Orderable Information](#).
- The package size (length × width) is a nominal value and includes pins, where applicable.
- The body size (length × width) is a nominal value and does not include pins.



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Simplified Schematic



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4 Pin Configuration and Functions

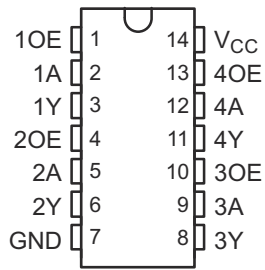


Figure 4-1. SN74LVC126A D, DB, DGV, NS, or PW Package; 14-Pin SOIC, SSOP, TVSOP, SOP or TSSOP (Top View)

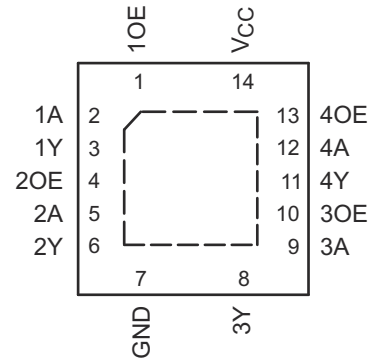


Figure 4-2. SN74LVC126A BQA or RGY Package; 14-Pin WQFN or VQFN (Top View)

Table 4-1. Pin Functions

| PIN | | I/O ⁽¹⁾ | DESCRIPTION |
|-------------|-----------------|--------------------|--|
| NO. | NAME | | |
| 1 | 1OE | I | Output enable 1 |
| 2 | 1A | I | Gate 1 input |
| 3 | 1Y | O | Gate 1 output |
| 4 | 2OE | I | Output enable 2 |
| 5 | 2A | I | Gate 2 input |
| 6 | 2Y | O | Gate 2 output |
| 7 | GND | — | Ground pin |
| 8 | 3Y | O | Gate 3 output |
| 9 | 3A | I | Gate 3 input |
| 10 | 3OE | I | Output enable 3 |
| 11 | 4Y | O | Gate 4 output |
| 12 | 4A | I | Gate 4 input |
| 13 | 4OE | I | Output Enable 4 |
| 14 | V _{CC} | — | Power pin |
| Thermal pad | | — | Connect the GND pin to the exposed thermal pad for correct operation. Connect the thermal pad to any internal PCB ground plane using multiple vias for good thermal performance. |

(1) I = input, O = output, P = power, FB = feedback, GND = ground, N/A = not applicable

5 Specifications

5.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

| | | | MIN | MAX | UNIT |
|-----------------------------------|---|---|------|-----------------------|------|
| V _{CC} | Supply voltage | | -0.5 | 6.5 | V |
| V _I ⁽²⁾ | Input voltage | | -0.5 | 6.5 | V |
| V _O ^{(2) (3)} | Output voltage | | -0.5 | V _{CC} + 0.5 | V |
| I _{IK} | Input clamp current | V _I < 0 | | -50 | mA |
| I _{OK} | Output clamp current | V _O < 0 | | -50 | mA |
| I _O | Continuous output current | | | ±50 | mA |
| | Continuous current through V _{CC} or GND | | | ±100 | mA |
| P _{tot} | Power dissipation | T _A = -40°C to +125°C ^{(4) (5)} | | 500 | mW |
| T _J | Maximum junction temperature | | | 150 | °C |
| T _{stg} | Storage temperature | | -65 | 150 | °C |

- (1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. 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 current ratings are observed.
- (3) The value of V_{CC} is provided in *Recommended Operating Conditions*.
- (4) For the D package: above 70°C, the value of P_{tot} derates linearly with 8 mW/K.
- (5) For the DB, NS, and PW packages: above 60°C, the value of P_{tot} derates linearly with 5.5 mW/K.

5.2 ESD Ratings

| | | VALUE | UNIT |
|--------------------|-------------------------|--|-------|
| V _(ESD) | Electrostatic discharge | Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾ | ±2000 |
| | | Charged-device model (CDM), per JEDEC specification JESD22-C101 ⁽²⁾ | ±1500 |

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process. This rating was tested on the D (SOIC) package.
- (2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process. This rating was tested on the D (SOIC) package.

5.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

| | | | MIN | NOM | MAX | UNIT | |
|-----------------|---------------------------|------------------------------------|------------------------|-----|-----------------|------|----|
| V _{CC} | Supply voltage | Operating | 1.65 | | 3.6 | V | |
| | | Data retention only | 1.5 | | | | |
| V _{IH} | High-level input voltage | V _{CC} = 1.65 V to 1.95 V | 0.65 × V _{CC} | | | V | |
| | | V _{CC} = 2.3 V to 2.7 V | 1.7 | | | | |
| | | V _{CC} = 2.7 V to 3.6 V | 2 | | | | |
| V _{IL} | Low-level input voltage | V _{CC} = 1.65 V to 1.95 V | 0.35 × V _{CC} | | | V | |
| | | V _{CC} = 2.3 V to 2.7 V | 0.7 | | | | |
| | | V _{CC} = 2.7 V to 3.6 V | 0.8 | | | | |
| V _I | Input voltage | | 0 | | 5.5 | V | |
| V _O | Output voltage | | 0 | | V _{CC} | V | |
| I _{OH} | High-level output current | V _{CC} = 1.65 V | | | | -4 | mA |
| | | V _{CC} = 2.3 V | | | | -8 | |
| | | V _{CC} = 2.7 V | | | | -12 | |
| | | V _{CC} = 3 V | | | | -24 | |

5.3 Recommended Operating Conditions (continued)

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

| | | MIN | NOM | MAX | UNIT |
|-----------------|------------------------------------|--------------------------|-----|-----|------|
| I _{OL} | Low-level output current | V _{CC} = 1.65 V | | 4 | mA |
| | | V _{CC} = 2.3 V | | 8 | |
| | | V _{CC} = 2.7 V | | 12 | |
| | | V _{CC} = 3 V | | 24 | |
| Δt/Δv | Input transition rise or fall rate | | | 10 | ns/V |
| T _A | Operating free-air temperature | -40 | | 125 | °C |

- (1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. See the TI application report, [Implications of Slow or Floating CMOS Inputs](#).

5.4 Thermal Information

| THERMAL METRIC ⁽¹⁾ | SN74LVC126A | | | | | | | UNIT | |
|-------------------------------|--|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|------|
| | BQA (WQFN) | D (SOIC) | DB (SSOP) | DGV (TVSOP) | NS (SOP) | PW (TSSOP) | RGY (VQFN) | | |
| | 14 PINS | 14 PINS | 14 PINS | 14 PINS | 14 PINS | 14 PINS | 14 PINS | | |
| R _{θJA} | Junction-to-ambient thermal resistance | 102.3 ⁽³⁾ | 127.8 ⁽²⁾ | 112.2 ⁽²⁾ | 140.9 ⁽²⁾ | 123.8 ⁽²⁾ | 150.8 ⁽²⁾ | 92.1 ⁽³⁾ | °C/W |
| R _{θJC(top)} | Junction-to-case (top) thermal resistance | 96.8 | 81.9 | 64.2 | 59.9 | 51.7 | 78.3 | 91.8 | °C/W |
| R _{θJB} | Junction-to-board thermal resistance | 70.9 | 84.4 | 59.6 | 70.2 | 52.7 | 93.8 | 66.7 | °C/W |
| Ψ _{JT} | Junction-to-top characterization parameter | 16.6 | 39.6 | 28.3 | 9.1 | 20.7 | 38.2 | 20 | °C/W |
| Ψ _{JB} | Junction-to-board characterization parameter | 70.9 | 83.9 | 59.1 | 69.5 | 52.3 | 93.2 | 66.5 | °C/W |
| R _{θJC(bot)} | Junction-to-case (bottom) thermal resistance | 50.1 | N/A | N/A | N/A | N/A | N/A | 50.1 | °C/W |

- (1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC Package Thermal Metrics](#) application report.
- (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.

5.5 Electrical Characteristics

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

| PARAMETER | TEST CONDITIONS | | MIN | TYP | MAX | UNIT | |
|--|---|--|--|----------|-----|---------|--|
| V_{OH} | $I_{OH} = -100 \mu A, V_{CC} = 1.65 V \text{ to } 3.6 V$ | $T_A = 25^\circ C$ | $V_{CC} - 0.2$ | | | V | |
| | | $T_A = -40^\circ C \text{ to } +125^\circ C$ | $V_{CC} - 0.3$ | | | | |
| | $I_{OH} = -4 mA, V_{CC} = 1.65 V$ | $T_A = 25^\circ C$ | 1.29 | | | | |
| | | $T_A = -40^\circ C \text{ to } +85^\circ C$ | 1.2 | | | | |
| | | $T_A = -40^\circ C \text{ to } +125^\circ C$ | 1.05 | | | | |
| | $I_{OH} = -8 mA, V_{CC} = 2.3 V$ | $T_A = 25^\circ C$ | 1.9 | | | | |
| | | $T_A = -40^\circ C \text{ to } +85^\circ C$ | 1.7 | | | | |
| | | $T_A = -40^\circ C \text{ to } +125^\circ C$ | 1.55 | | | | |
| | $I_{OH} = -12 mA$ | $V_{CC} = 2.7 V$ | $T_A = 25^\circ C$ | 2.2 | | | |
| | | | $T_A = -40^\circ C \text{ to } +125^\circ C$ | 2.05 | | | |
| | | $V_{CC} = 3 V$ | $T_A = 25^\circ C$ | 2.4 | | | |
| | | | $T_A = -40^\circ C \text{ to } +125^\circ C$ | 2.25 | | | |
| $I_{OH} = -24 mA, V_{CC} = 3 V$ | $T_A = 25^\circ C$ | 2.3 | | | | | |
| | $T_A = -40^\circ C \text{ to } +85^\circ C$ | 2.2 | | | | | |
| | $T_A = -40^\circ C \text{ to } +125^\circ C$ | 2 | | | | | |
| V_{OL} | $I_{OL} = 100 \mu A, V_{CC} = 1.65 V \text{ to } 3.6 V$ | $T_A = 25^\circ C$ | | 0.1 | | V | |
| | | $T_A = -40^\circ C \text{ to } +85^\circ C$ | | 0.2 | | | |
| | | $T_A = -40^\circ C \text{ to } +125^\circ C$ | | 0.3 | | | |
| | $I_{OL} = 4 mA, V_{CC} = 1.65 V$ | $T_A = 25^\circ C$ | | 0.24 | | | |
| | | $T_A = -40^\circ C \text{ to } +85^\circ C$ | | 0.45 | | | |
| | | $T_A = -40^\circ C \text{ to } +125^\circ C$ | | 0.6 | | | |
| | $I_{OL} = 8 mA, V_{CC} = 2.3 V$ | $T_A = 25^\circ C$ | | 0.3 | | | |
| | | $T_A = -40^\circ C \text{ to } +85^\circ C$ | | 0.7 | | | |
| | | $T_A = -40^\circ C \text{ to } +125^\circ C$ | | 0.75 | | | |
| | $I_{OL} = 12 mA, V_{CC} = 2.7 V$ | $T_A = 25^\circ C$ | | 0.4 | | | |
| | | $T_A = -40^\circ C \text{ to } +125^\circ C$ | | 0.6 | | | |
| | $I_{OL} = 24 mA, V_{CC} = 3 V$ | $T_A = 25^\circ C$ | | 0.55 | | | |
| $T_A = -40^\circ C \text{ to } +125^\circ C$ | | | 0.8 | | | | |
| I_I | $V_I = 5.5 V \text{ or } GND, V_{CC} = 3.6 V$ | $T_A = 25^\circ C$ | | ± 1 | | μA | |
| | | $T_A = -40^\circ C \text{ to } +85^\circ C$ | | ± 5 | | | |
| | | $T_A = -40^\circ C \text{ to } +125^\circ C$ | | ± 20 | | | |
| I_{OZ} | $V_O = V_{CC} \text{ or } GND, V_{CC} = 3.6 V$ | $T_A = 25^\circ C$ | | ± 1 | | μA | |
| | | $T_A = -40^\circ C \text{ to } +85^\circ C$ | | ± 10 | | | |
| | | $T_A = -40^\circ C \text{ to } +125^\circ C$ | | ± 20 | | | |
| I_{CC} | $V_I = V_{CC} \text{ or } GND, I_O = 0, V_{CC} = 3.6 V$ | $T_A = 25^\circ C$ | | 1 | | μA | |
| | | $T_A = -40^\circ C \text{ to } +85^\circ C$ | | 10 | | | |
| | | $T_A = -40^\circ C \text{ to } +125^\circ C$ | | 40 | | | |
| ΔI_{CC} | One input at $V_{CC} - 0.6 V$, other inputs at V_{CC} or $GND, V_{CC} = 2.7 V \text{ to } 3.6 V$ | $T_A = 25^\circ C$ | | 500 | | μA | |
| | | $T_A = -40^\circ C \text{ to } +125^\circ C$ | | 5000 | | | |
| C_i | $V_I = V_{CC} \text{ or } GND, V_{CC} = 3.3 V$ | | | 4.5 | | pF | |
| C_o | $V_O = V_{CC} \text{ or } GND, V_{CC} = 3.3 V$ | | | 7 | | pF | |

5.5 Electrical Characteristics (continued)

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

| PARAMETER | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|--|--|------------------|--------------------------|-----|-----|------|
| C_{pd} Power dissipation capacitance per gate | $f = 10 \text{ MHz}, T_A = 25^\circ\text{C}$ | Outputs enabled | $V_{CC} = 1.8 \text{ V}$ | | 20 | pF |
| | | | $V_{CC} = 2.5 \text{ V}$ | | 21 | |
| | | | $V_{CC} = 3.3 \text{ V}$ | | 22 | |
| | | Outputs disabled | $V_{CC} = 1.8 \text{ V}$ | | 2 | |
| | | | $V_{CC} = 2.5 \text{ V}$ | | 3 | |
| | | | $V_{CC} = 3.3 \text{ V}$ | | 4 | |

5.6 Switching Characteristics

over recommended operating free-air temperature range (unless otherwise noted; see [Parameter Measurement Information](#))

| PARAMETER | TEST CONDITIONS | | MIN | TYP | MAX | UNIT | |
|-----------|-------------------------------|---|--|-----|-----|------|----|
| t_{pd} | From A (input) to Y (output) | $V_{CC} = 1.8 \text{ V} \pm 0.15 \text{ V}$ | $T_A = 25^\circ\text{C}$ | 1 | 4.2 | 9.3 | ns |
| | | | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ | | | 9.8 | |
| | | | $T_A = -40^\circ\text{C to } +125^\circ\text{C}$ | | | 11.3 | |
| | | $V_{CC} = 2.5 \text{ V} \pm 0.2 \text{ V}$ | $T_A = 25^\circ\text{C}$ | 1 | 2.7 | 6.7 | |
| | | | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ | | | 7.2 | |
| | | | $T_A = -40^\circ\text{C to } +125^\circ\text{C}$ | | | 9.3 | |
| | | $V_{CC} = 2.7 \text{ V}$ | $T_A = 25^\circ\text{C}$ | 1 | 2.9 | 5 | |
| | | | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ | | | 5.2 | |
| | | | $T_A = -40^\circ\text{C to } +125^\circ\text{C}$ | | | 6.5 | |
| | | $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$ | $T_A = 25^\circ\text{C}$ | 1 | 2.5 | 4.5 | |
| | | | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ | | | 4.7 | |
| | | | $T_A = -40^\circ\text{C to } +125^\circ\text{C}$ | | | 6 | |
| t_{en} | From OE (input) to Y (output) | $V_{CC} = 1.8 \text{ V} \pm 0.15 \text{ V}$ | $T_A = 25^\circ\text{C}$ | 1 | 4.8 | 9.5 | ns |
| | | | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ | | | 10 | |
| | | | $T_A = -40^\circ\text{C to } +125^\circ\text{C}$ | | | 11.5 | |
| | | $V_{CC} = 2.5 \text{ V} \pm 0.2 \text{ V}$ | $T_A = 25^\circ\text{C}$ | 1 | 2.8 | 7.8 | |
| | | | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ | | | 8.3 | |
| | | | $T_A = -40^\circ\text{C to } +125^\circ\text{C}$ | | | 10.4 | |
| | | $V_{CC} = 2.7 \text{ V}$ | $T_A = 25^\circ\text{C}$ | 1 | 3.1 | 6.1 | |
| | | | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ | | | 6.3 | |
| | | | $T_A = -40^\circ\text{C to } +125^\circ\text{C}$ | | | 8 | |
| | | $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$ | $T_A = 25^\circ\text{C}$ | 1 | 2.5 | 5.5 | |
| | | | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ | | | 5.7 | |
| | | | $T_A = -40^\circ\text{C to } +125^\circ\text{C}$ | | | 7.5 | |

5.6 Switching Characteristics (continued)

over recommended operating free-air temperature range (unless otherwise noted; see [Parameter Measurement Information](#))

| PARAMETER | TEST CONDITIONS | | | MIN | TYP | MAX | UNIT |
|--------------------|---------------------------------|----------------------------------|----------------------------------|-----|-----|------|------|
| t _{dis} | From OE (input) to Y (output) | V _{CC} = 1.8 V ± 0.15 V | T _A = 25°C | 1 | 4.4 | 12.1 | ns |
| | | | T _A = -40°C to +85°C | | | 12.6 | |
| | | | T _A = -40°C to +125°C | | | 14.1 | |
| | | V _{CC} = 2.5 V ± 0.2 V | T _A = 25°C | 1 | 2.7 | 8.2 | |
| | | | T _A = -40°C to +85°C | | | 8.7 | |
| | | | T _A = -40°C to +125°C | | | 10.8 | |
| | | V _{CC} = 2.7 V | T _A = 25°C | 1 | 2.7 | 6.5 | |
| | | | T _A = -40°C to +85°C | | | 6.7 | |
| | | | T _A = -40°C to +125°C | | | 8.5 | |
| | | V _{CC} = 3.3 V ± 0.3 V | T _A = 25°C | 1.3 | 2.3 | 5.8 | |
| | | | T _A = -40°C to +85°C | | | 6 | |
| | | | T _A = -40°C to +125°C | | | 7.5 | |
| t _{sk(o)} | V _{CC} = 3.3 V ± 0.3 V | T _A = -40°C to +85°C | | | 1 | ns | |
| | | T _A = -40°C to +125°C | | | 1.5 | | |

5.7 Typical Characteristics

T_A = 25°C

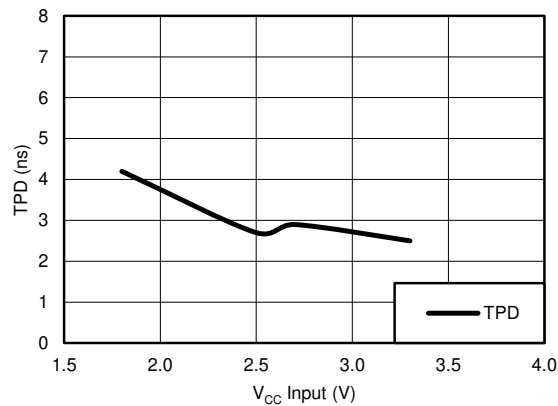


Figure 5-1. TPD vs V_{CC}

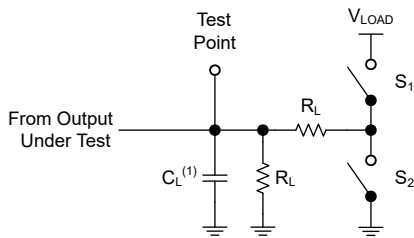
6 Parameter Measurement Information

Phase relationships between waveforms were chosen arbitrarily for the examples listed in the following table. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1MHz, Z_O = 50Ω, t_i ≤ 2.5ns.

The outputs are measured individually with one input transition per measurement.

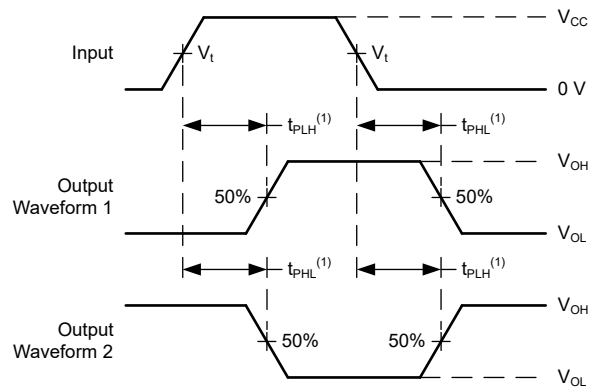
| TEST | S1 | S2 | R _L | C _L | ΔV | V _{LOAD} |
|-------------------------------------|--------|--------|----------------|----------------|------|-------------------|
| t _{PLH} , t _{PHL} | OPEN | OPEN | 500Ω | 50pF | — | — |
| t _{PLZ} , t _{PZL} | CLOSED | OPEN | 500Ω | 50pF | 0.3V | 2×V _{CC} |
| t _{PHZ} , t _{PZH} | OPEN | CLOSED | 500Ω | 50pF | 0.3V | — |

| V _{CC} | V _t | R _L | C _L | ΔV | V _{LOAD} |
|-----------------|--------------------|----------------|----------------|-------|-------------------|
| 1.8V ± 0.15V | V _{CC} /2 | 1kΩ | 30pF | 0.15V | 2×V _{CC} |
| 2.5V ± 0.2V | V _{CC} /2 | 500Ω | 30pF | 0.15V | 2×V _{CC} |
| 2.7V | 1.5V | 500Ω | 50pF | 0.3V | 6V |
| 3.3V ± 0.3V | 1.5V | 500Ω | 50pF | 0.3V | 6V |



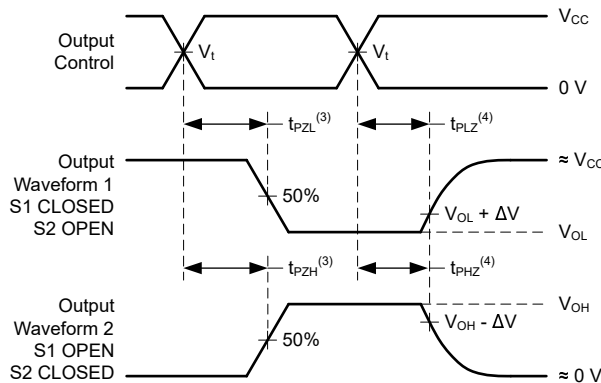
(1) C_L includes probe and test-fixture capacitance.

Figure 6-1. Load Circuit for 3-State Outputs



(1) The greater between t_{PLH} and t_{PHL} is the same as t_{pd}.

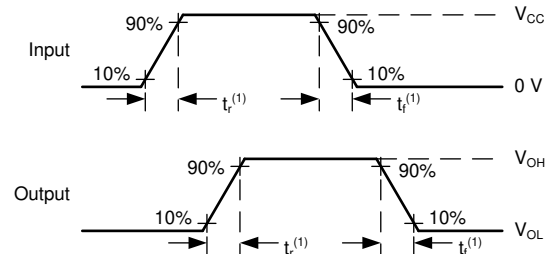
Figure 6-2. Voltage Waveforms Propagation Delays



(1) The greater between t_{PZL} and t_{PZH} is the same as t_{en}.

(2) The greater between t_{PLZ} and t_{PHZ} is the same as t_{dis}.

Figure 6-3. Voltage Waveforms Propagation Delays



(1) The greater between t_r and t_f is the same as t_t.

Figure 6-4. Voltage Waveforms, Input and Output Transition Times

7 Detailed Description

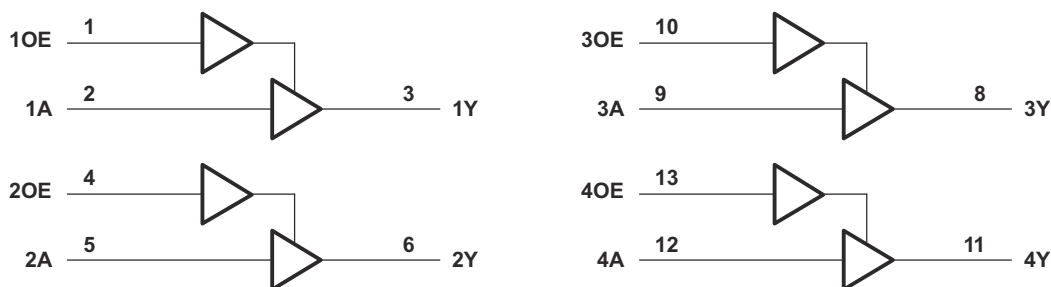
7.1 Overview

The SN74LVC126A quadruple buffer is designed for 1.65-V to 3.6-V V_{CC} operation and features tri-state outputs.

The SN74LVC126A devices perform the Boolean function $Y = A$ in positive logic.

Inputs can be driven from either 3.3-V or 5-V devices. This feature allows the use of these devices as down-translators in a mixed 3.3-V or 5-V system environment.

7.2 Functional Block Diagram



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7.3 Feature Description

The SN74LVC126A device features four independent buffers with 3-state outputs, and is designed to operate from a V_{CC} of 1.65 V to 3.6 V. When the output enable (OE) input is low, the corresponding output is disabled and enters a high-impedance state. This device also features high-tolerance inputs, allowing for voltage translation in mixed voltage systems. Wide operating temperature range enables this device to be used in any application, including rugged or extreme environments.

7.4 Device Functional Modes

The SN74LVC126A's 3-state outputs allow the outputs to be disabled using the output enable (OE) pin. To ensure the high-impedance state during power up and power down, OE must be tied to GND through a pull-down resistor. The minimum value of the resistor is determined by the current-sourcing capability of the driver.

**Table 7-1. Function Table
(Each Buffer)**

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

8 Application and Implementation

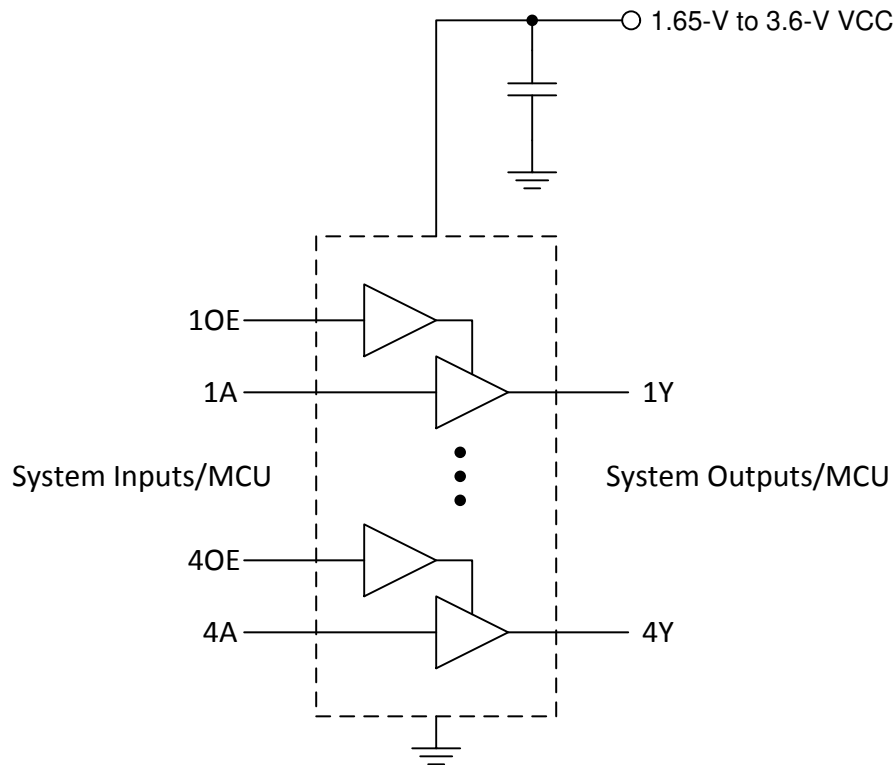
Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

8.1 Application Information

The SN74LVC126A device is a high-drive, CMOS device that can be used for a multitude of buffer-type functions. It can produce 24 mA of drive current at 3 V. Therefore, this device is ideal for driving multiple inputs and for high-speed applications up to 100 MHz. The inputs and outputs are 5.5-V tolerant allowing the device to translate up to 5.5 V or down to V_{CC} .

8.2 Typical Application



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Figure 8-1. Typical Buffer Application and Supply Voltage

8.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Take care to avoid bus contention because it can drive currents that would exceed maximum limits. The high drive also creates fast edges into light loads; therefore, routing and load conditions must be considered to prevent ringing.

8.2.2 Detailed Design Procedure

1. Recommended Input Conditions

- Rise time and fall time specifications: See $(\Delta t/\Delta V)$ in [Recommended Operating Conditions](#).
- Specified high and low levels: See $(V_{IH}$ and $V_{IL})$ in [Recommended Operating Conditions](#).
- Inputs are overvoltage tolerant allowing them to go as high as 5.5 V at any valid V_{CC} .

2. Recommended Output Conditions

- Load currents must not exceed 25 mA per output and 50 mA total for the part.
- Outputs must not be pulled above 5.5 V.

8.2.3 Application Curve

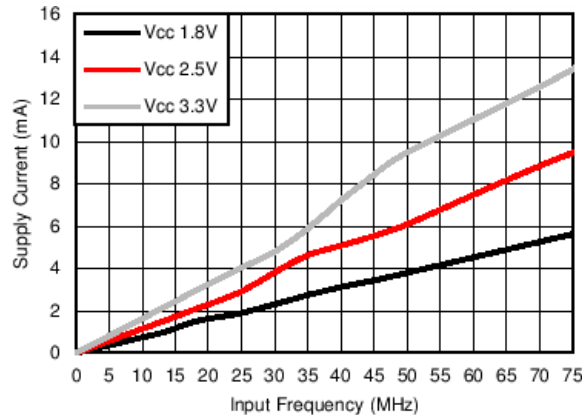


Figure 8-2. Supply Current vs Input Frequency

8.3 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating in the [Recommended Operating Conditions](#).

Each V_{CC} pin must have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1 μF is recommended; if there are multiple V_{CC} pins, then 0.01 μF or 0.022 μF is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A 0.1 μF and a 1 μF are commonly used in parallel. The bypass capacitor must be installed as close to the power pin as possible for best results.

8.4 Layout

8.4.1 Layout Guidelines

When using multiple bit logic devices, inputs must never float.

In many cases, functions or parts of functions of digital logic devices are unused, for example, when only two inputs of a triple-input and gate are used, or only 3 of the 4 buffer gates are used. Such input pins must not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. [Figure 8-3](#) specifies the rules that must be observed under all circumstances. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that must be applied to any particular unused input depends on the function of the device. Generally they are tied to GND or V_{CC} , whichever makes more sense or is more convenient. It is generally acceptable to float outputs, unless the part is a transceiver.

8.4.2 Layout Example

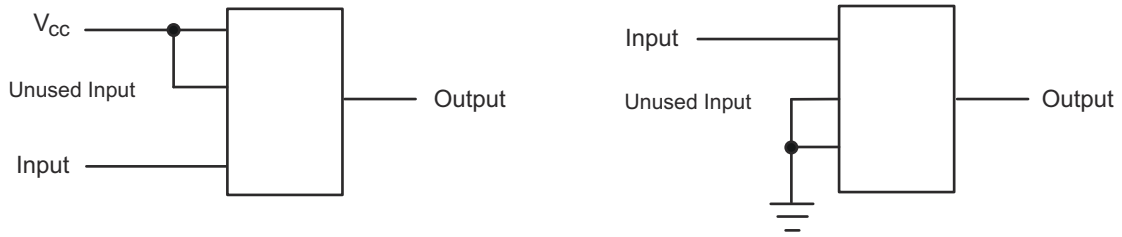


Figure 8-3. Layout Diagram

9 Device and Documentation Support

9.1 Documentation Support

9.1.1 Related Documentation

For related documentation see the following:

TI application report, [Implications of Slow or Floating CMOS Inputs](#) (SCBA004)

9.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](#). Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

9.3 Support Resources

[TI E2E™ support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

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9.4 Trademarks

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9.5 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

9.6 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

10 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision T (May 2024) to Revision U (July 2024) Page

- Updated RθJA values: D = 98.4 to 127.8, NS = 93.9 to 123.8, PW = 127.7 to 150.8, RGY = 35 to 92.1; Updated D, NS, PW, and RGY packages for RθJC(top), RθJB, ΨJT, ΨJB, and RθJC(bot), all values in °C/W **5**

Changes from Revision S (February 2017) to Revision T (May 2024) Page

- Updated the numbering format for tables, figures, and cross-references throughout the document..... **1**
- Added BQA package to *Package Information* table, *Pin Configuration and Functions* section, and *Thermal Information* table..... **1**
- Added package size to *Package Information* table..... **1**

11 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead finish/ Ball material (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|-------------------|---------------|--------------|-----------------|------|-------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|-------------------------|
| SN74LVC126ABQAR | ACTIVE | WQFN | BQA | 14 | 3000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LV126A | Samples |
| SN74LVC126AD | ACTIVE | SOIC | D | 14 | 50 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LVC126A | Samples |
| SN74LVC126ADBR | ACTIVE | SSOP | DB | 14 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC126A | Samples |
| SN74LVC126ADGVR | ACTIVE | TVSOP | DGV | 14 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC126A | Samples |
| SN74LVC126ADR | ACTIVE | SOIC | D | 14 | 2500 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LVC126A | Samples |
| SN74LVC126ADRE4 | ACTIVE | SOIC | D | 14 | 2500 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LVC126A | Samples |
| SN74LVC126ADRG4 | ACTIVE | SOIC | D | 14 | 2500 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LVC126A | Samples |
| SN74LVC126ADT | ACTIVE | SOIC | D | 14 | 250 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LVC126A | Samples |
| SN74LVC126ANSR | ACTIVE | SO | NS | 14 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LVC126A | Samples |
| SN74LVC126APW | ACTIVE | TSSOP | PW | 14 | 90 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC126A | Samples |
| SN74LVC126APWG4 | ACTIVE | TSSOP | PW | 14 | 90 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC126A | Samples |
| SN74LVC126APWR | ACTIVE | TSSOP | PW | 14 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC126A | Samples |
| SN74LVC126APWRE4 | ACTIVE | TSSOP | PW | 14 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC126A | Samples |
| SN74LVC126APWRG4 | ACTIVE | TSSOP | PW | 14 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC126A | Samples |
| SN74LVC126APWT | ACTIVE | TSSOP | PW | 14 | 250 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 125 | LC126A | Samples |
| SN74LVC126ARGYR | ACTIVE | VQFN | RGY | 14 | 3000 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -40 to 125 | LC126A | Samples |
| SN74LVC126ARGYRG4 | ACTIVE | VQFN | RGY | 14 | 3000 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -40 to 125 | LC126A | Samples |

(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.

OBSELETE: 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 ≤ 1000 ppm threshold. Antimony trioxide based flame retardants must also meet the ≤ 1000 ppm 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 SN74LVC126A :

- Automotive : [SN74LVC126A-Q1](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

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