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Diodes Incorporated
74AHCT1G126W5-7

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NEW PRODUCT

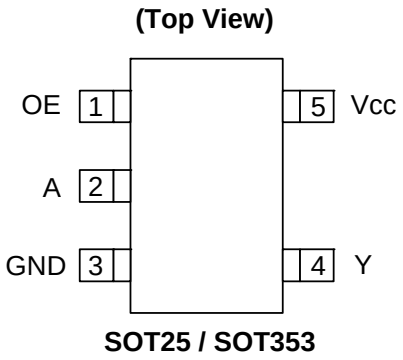
# 74AHCT1G126

## SINGLE BUFFER GATE WITH 3-STATE OUTPUT

## Description

The 74AHCT1G126 is a single non-inverting buffer/bus driver with a 3-state output. The output enters a high impedance state when a LOW-level is applied to the output enable (OE) pin. The device is designed for operation with a power supply range of 4.5V to 5.5V.

## Pin Assignments




## Features

- Supply Voltage Range from 4.5V to 5.5V
- ± 8 mA Output Drive at 5.0V
- CMOS low power consumption
- Schmitt Trigger Action at All Inputs Make the Circuit Tolerant for Slower Input Rise and Fall Time.
- ESD Protection per JESD 22
  - Exceeds 200-V Machine Model (A115-A)
  - Exceeds 2000-V Human Body Model (A114-A)
  - Exceeds 1000-V Charged Device Model (C101C)
- Latch-Up Exceeds 100mA per JESD 78, Class II
- SOT25 and SOT353: Assembled with “Green” Molding Compound (no Br, Sb)
- Lead Free Finish / RoHS Compliant (Note 1)

## Applications

- General Purpose Logic
- Wide array of products such as:
  - PCs, networking, notebooks, netbooks, PDAs
  - Computer peripherals, hard drives, CD/DVD ROM
  - TV, DVD, DVR, set top box
  - Phones, Personal Navigation / GPS
  - MP3 players ,Cameras, Video Recorders

Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html.

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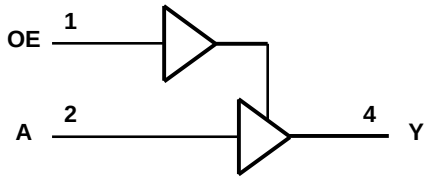
## Pin Descriptions

| Pin Name | Pin No. | Description |
|---|---|---|
| OE | 1 | Output Enable |
| A | 2 | Data Input |
| GND | 3 | Ground |
| Y | 4 | Data Output |
| $V_{CC}$ | 5 | Supply Voltage |

## Logic Diagram




## Function Table

| Inputs | | Output |
|---|---|---|
| OE | A | Y |
| H | H | H |
| H | L | L |
| L | X | Z |

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## Absolute Maximum Ratings (Note 2)

| Symbol | Description | Rating | Unit |
|---|---|---|---|
| ESD HBM | Human Body Model ESD Protection | 2 | KV |
| ESD CDM | Charged Device Model ESD Protection | 1 | KV |
| ESD MM | Machine Model ESD Protection | 200 | V |
| $V_{CC}$ | Supply Voltage Range | -0.5 to 6.5 | V |
| $V_I$ | Input Voltage Range | -0.5 to 6.5 | V |
| $V_O$ | Voltage applied to output in high or low state | -0.5 to $V_{CC}$ +0.5 | V |
| $I_{IK}$ | Input Clamp Current $V_I$<0 | -20 | mA |
| $I_{OK}$ | Output Clamp Current ($V_O$ < 0 or $V_O$ > $V_{CC}$) | ±20 | mA |
| $I_O$ | Continuous output current ($V_O$ = 0 to $V_{CC}$) | ±25 | mA |
| $I_{CC}$ | Continuous current through $V_{CC}$ | 50 | mA |
| $I_{GND}$ | Continuous current through GND | -50 | mA |
| $T_J$ | Operating Junction Temperature | -40 to 150 | °C |
| $T_{STG}$ | Storage Temperature | -65 to 150 | °C |

Notes: 2. Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.

## Recommended Operating Conditions (Note 3)

| Symbol | Parameter | | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | Operating Voltage | | 4.5 | 5.5 | V |
| $V_{IH}$ | High-level Input Voltage | | 2.0 | | V |
| $V_{IL}$ | Low-level input voltage | | | 0.8 | V |
| $V_I$ | Input Voltage | | 0 | 5.5 | V |
| $V_O$ | Output Voltage | | 0 | $V_{CC}$ | V |
| $I_{OH}$ | High-level output current | | | -8 | mA |
| $I_{OL}$ | Low-level output current | | | 8 | mA |
| Δt/ΔV | Input transition rise or fall rate | | | 20 | ns/V |
| $T_A$ | Operating free-air temperature | | -40 | 125 | ºC |

Notes: 3. Unused inputs should be held at $V_{CC}$ or Ground.

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## Electrical Characteristics

| Symbol | Parameter | Test Conditions | $V_{CC}$ | 25°C | | | -40°C to 85°C | | -40°C to 125°C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Min | Typ. | Max | Min | Max | Min | Max | |
| $V_{OH}$ | High Level Output Voltage | $I_{OH}$ = -50µA | 4.5V | 4.4 | 4.5 | | 4.4 | | 4.4 | | V |
| | | $I_{OH}$ = -8mA | 4.5V | 3.94 | | | 3.8 | | 3.70 | | |
| $V_{OL}$ | Low Level Output Voltage | $I_{OL}$ = 50µA | 4.5V | | 0 | 0.1 | | 0.1 | | 0.1 | V |
| | | $I_{OL}$ = 8mA | 4.5V | | | 0.36 | | 0.44 | | 0.55 | |
| $I_I$ | Input Current | $V_I$ = 5.5V or GND | 0 to 5.5V | | | ± 0.1 | | ± 1 | | ± 2 | µA |
| $I_{OZ}$ | Z State Leakage Current | $V_O$ =0 to 5.5V | 5.5V | | | 0.25 | | 2.5 | | 10 | µA |
| $I_{CC}$ | Supply Current | $V_I$ = 5.5V or GND $I_O$=0 | 5.5V | | | 1 | | 10 | | 40 | µA |
| $C_i$ | Input Capacitance | $V_I$ = $V_{CC}$ – or GND | 5.5V | | 2.0 | 10 | | 10 | | 10 | pF |
| $\Delta I_{CC}$ | Additional Supply Current | One input at 3.4 V Other inputs at $V_{CC}$ or GND | 5.5V | | | 1.35 | | 1.5 | | | mA |
| $\theta_{JA}$ | Thermal Resistance Junction-to-Ambient | SOT25 | (Note 4) | | 204 | | | | | | °C/W |
| | | SOT353 | | | 371 | | | | | | |
| $\theta_{JC}$ | Thermal Resistance Junction-to-Case | SOT25 | (Note 4) | | 52 | | | | | | °C/W |
| | | SOT353 | | | 143 | | | | | | |

Note: 4. Test conditions for SOT25, and SOT353: Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

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## Switching Characteristics

**$V_{CC}$ = 5V ± 0.5V** (see Figure 1)

| Parameter | From (Input) | TO (OUTPUT) | | 25ºC | | | -40ºC to 85ºC | | -40ºC to 125ºC | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Min | Typ. | Max | Min | Max | Min | Max | |
| $t_{pd}$ | A | Y | $C_L$=15pF | 0.6 | 3.4 | 5.5 | 0.6 | 6.5 | 0.6 | 7.0 | ns |
| | | | $C_L$=50pF | 0.6 | 4.7 | 7.5 | 0.6 | 8.5 | 0.6 | 9.5 | ns |
| $t_{en}$ | OE | Y | $C_L$=15pF | 0.6 | 3.6 | 5.6 | 0.6 | 6.3 | 0.6 | 6.5 | ns |
| | | | $C_L$=50pF | 0.6 | 5.4 | 8.0 | 0.6 | 9.0 | 0.6 | 9.0 | ns |
| $t_{dis}$ | OE | Y | $C_L$=15pF | 0.6 | 4.3 | 6.8 | 0.6 | 8.0 | 0.6 | 8.5 | ns |
| | | | $C_L$=50pF | 0.6 | 6.1 | 8.8 | 0.6 | 10.0 | 0.6 | 11.0 | ns |

## Operating Characteristics

$T_A$ = 25 ºC

| Parameter | | Test Conditions | $V_{CC}$ = 5 V | Unit |
|---|---|---|---|---|
| | | | Typ. | |
| $C_{pd}$ | Power dissipation capacitance | f = 1 MHz<br>No Load | 11 | pF |

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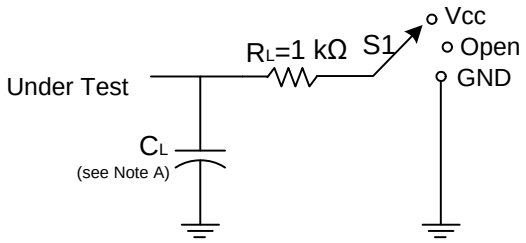
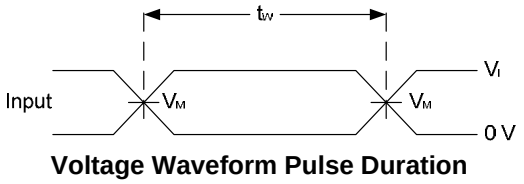
## Parameter Measurement Information

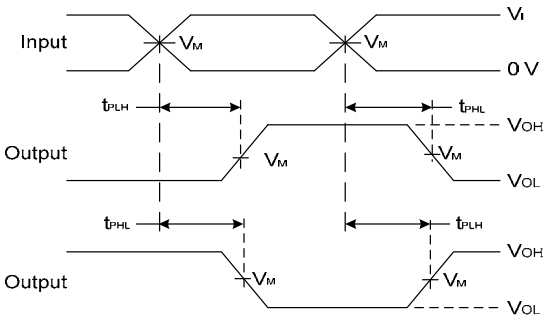



| TEST | S1 |
|---|---|
| $t_{PLH}/t_{PHL}$ | Open |
| $t_{PLZ}/t_{PZL}$ | Vload |
| $t_{PHZ}/t_{PZH}$ | GND |

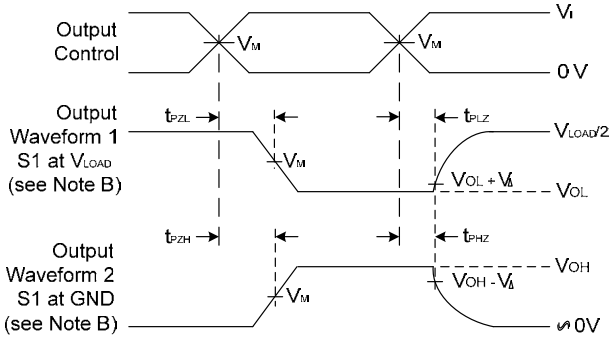
| Vcc | Inputs | | $V_M$ | $C_L$ | VΔ |
|---|---|---|---|---|---|
| | $V_I$ | $t_r/t_f$ | | | |
| 5V±0.5V | $V_{CC}$ | ≤3ns | $V_{CC}/2$ | 15pF | 0.3V |
| 5V±0.5V | $V_{CC}$ | ≤3ns | $V_{CC}/2$ | 50pF | 0.3V |




**Voltage Waveform Pulse Duration**




**Voltage Waveform Propagation Delay Times Inverting and Non Inverting Outputs**




**Voltage Waveform Enable and Disable Times Low and High Level Enabling**

**Figure 1. Load Circuit and Voltage Waveforms**

Notes: A. Includes test lead and test apparatus capacitance.
B. All pulses are supplied at pulse repetition rate ≤ 1 MHz.
C. Inputs are measured separately one transition per measurement.
D. $t_{PLZ}$ and $t_{PHZ}$ are the same as $t_{dis}$.
E. $t_{PZL}$ and $t_{PZH}$ are the same as $t_{EN}$.
F. $t_{PLH}$ and $t_{PHL}$ are the same as $t_{PD}$.

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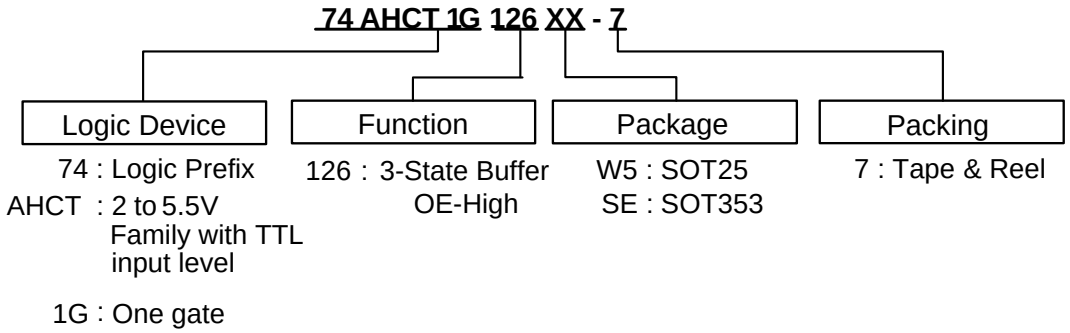
## Ordering Information

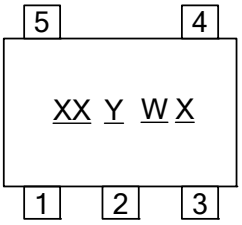



| Device | Package Code | Packaging (Note 5) | 7" Tape and Reel | |
|---|---|---|---|---|
| | | | Quantity | Part Number Suffix |
| 74AHCT1G126W5-7 | W5 | SOT25 | 3000/Tape & Reel | -7 |
| 74AHCT1G126SE-7 | SE | SOT353 | 3000/Tape & Reel | -7 |

Notes: 5. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.

## Marking Information

(Top View)




XX : Identification code
Y : Year 0~9
W : Week : A~Z : 1~26 week; a~z : 27~52 week; z represents 52 and 53 week
X : A~Z : Internal code

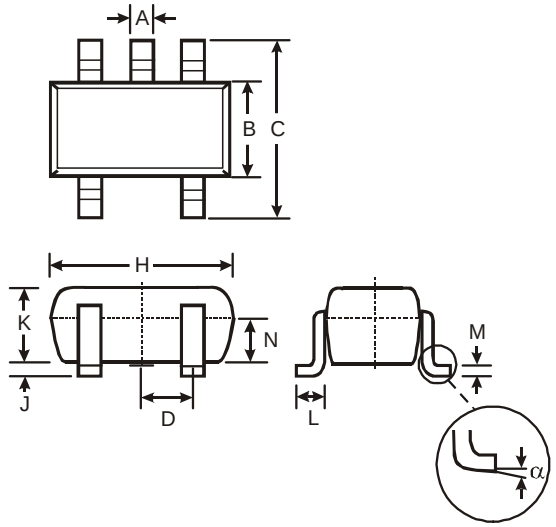
| Part Number | Package | Identification Code |
|---|---|---|
| 74AHCT1G126W5 | SOT25 | ZZ |
| 74AHCT1G126SE | SOT353 | ZZ |

# 74AHCT1G126

## SINGLE BUFFER GATE WITH 3-STATE OUTPUT

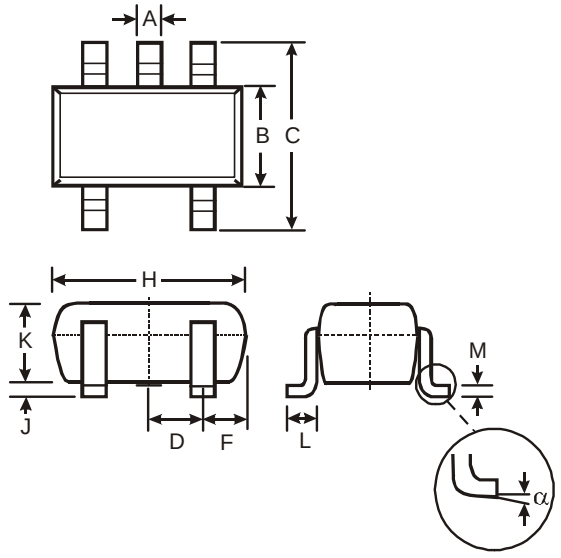
## Package Outline Dimensions (All Dimensions in mm)

### (1) Package Type: SOT25




| SOT25 | | | |
|---|---|---|---|
| Dim | Min | Max | Typ |
| A | 0.35 | 0.50 | 0.38 |
| B | 1.50 | 1.70 | 1.60 |
| C | 2.70 | 3.00 | 2.80 |
| D | — | — | 0.95 |
| H | 2.90 | 3.10 | 3.00 |
| J | 0.013 | 0.10 | 0.05 |
| K | 1.00 | 1.30 | 1.10 |
| L | 0.35 | 0.55 | 0.40 |
| M | 0.10 | 0.20 | 0.15 |
| N | 0.70 | 0.80 | 0.75 |
| α | 0° | 8° | — |
| All Dimensions in mm | | | |

### (2) Package Type: SOT353




| SOT353 | | |
|---|---|---|
| Dim | Min | Max |
| A | 0.10 | 0.30 |
| B | 1.15 | 1.35 |
| C | 2.00 | 2.20 |
| D | 0.65 Typ | |
| F | 0.40 | 0.45 |
| H | 1.80 | 2.20 |
| J | 0 | 0.10 |
| K | 0.90 | 1.00 |
| L | 0.25 | 0.40 |
| M | 0.10 | 0.22 |
| α | 0° | 8° |
| All Dimensions in mm | | |

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