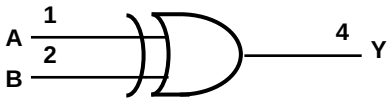
NEW PRODUCT

## Pin Descriptions

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

## Logic Diagram




## Function Table

| Inputs | | Output |
|---|---|---|
| A | B | Y |
| H | H | L |
| L | H | H |
| H | L | H |
| L | L | L |


© Diodes Incorporated

NEW PRODUCT

## 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 | | 2 | 5.5 | V |
| $V_{IH}$ | High-level Input Voltage | $V_{CC}$ = 2V | 1.5 | | V |
| | | $V_{CC}$ = 3V | 2.1 | | |
| | | $V_{CC}$ = 5.5V | 3.85 | | |
| $V_{IL}$ | Low-level input voltage | $V_{CC}$ = 2V | | 0.5 | V |
| | | $V_{CC}$ = 3V | | 0.9 | |
| | | $V_{CC}$ = 5.5V | | 1.65 | |
| $V_I$ | Input Voltage | | 0 | 5.5 | V |
| $V_O$ | Output Voltage | | 0 | $V_{CC}$ | V |
| $I_{OH}$ | High-level output current | $V_{CC}$ = 2V | | -50 | uA |
| | | $V_{CC}$ = 3.3 V ± 0.3V | | -4 | mA |
| | | $V_{CC}$ = 5V ± 0.5V | | -8 | |
| $I_{OL}$ | Low-level output current | $V_{CC}$ = 2V | | 50 | uA |
| | | $V_{CC}$ = 5V ± 0.5V | | 4 | mA |
| | | $V_{CC}$ = 3V | | 8 | |
| Δt/ΔV | Input transition rise or fall rate | $V_{CC}$ = 3.3V ± 0.3V | | 100 | ns/V |
| | | $V_{CC}$ = 5V ± 0.5V | | 20 | |
| $T_A$ | Operating free-air temperature | | -40 | 125 | ºC |

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


© Diodes Incorporated

NEW PRODUCT

## Electrical Characteristics

| Symbol | Parameter | Test Conditions | $V_{CC}$ | 25ºC | | | -40ºC to 85ºC | | -40ºC to 125ºC | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Min | Typ. | Max | Min | Max | Min | Max | |
| $V_{OH}$ | High Level Output Voltage | $I_{OH}$ = -50µA | 2V | 1.9 | 2 | | 1.9 | | 1.9 | | V |
| | | | 3V | 2.9 | 3 | | 2.9 | | 2.9 | | |
| | | | 4.5V | 4.4 | 4.5 | | 4.4 | | 4.4 | | |
| | | $I_{OH}$ = -4mA | 3V | 2.58 | | | 2.48 | | 2.40 | | |
| | | $I_{OH}$ = -8mA | 4.5V | 3.94 | | | 3.8 | | 3.70 | | |
| $V_{OL}$ | Low Level Output Voltage | $I_{OL}$ = 50µA | 2V | | | 0.1 | | 0.1 | | 0.1 | V |
| | | | 3V | | | 0.1 | | 0.1 | | 0.1 | |
| | | | 4.5V | | | 0.1 | | 0.1 | | 0.1 | |
| | | $I_{OL}$ = 4mA | 3V | | | 0.36 | | 0.44 | | 0.55 | |
| | | $I_{OL}$ = 8mA | 4.5V | | | 0.36 | | 0.44 | | 0.55 | |
| $I_I$ | Input Current | $V_I$ = 5.5 V or GND | 0 to 5.5V | | | ± 0.1 | | ± 1 | | ± 2 | 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 |
| $\theta_{JA}$ | Thermal Resistance Junction-to-Ambient | SOT25 | (Note 4) | | 195 | | | | | | °C/W |
| | | SOT353 | | | 430 | | | | | | |
| $\theta_{JC}$ | Thermal Resistance Junction-to-Case | SOT25 | (Note 4) | | 58 | | | | | | °C/W |
| | | SOT353 | | | 155 | | | | | | |

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

## Switching Characteristics

**$V_{CC}$ = 3.3V ± 0.3** (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 or B | Y | $C_L$=15pF | 0.6 | 4.0 | 11.0 | 0.6 | 13.0 | 0.6 | 14.0 | ns |
| | | | $C_L$=50pF | 0.6 | 5.8 | 14.5 | 0.6 | 16.5 | 0.6 | 18.5 | ns |

**$V_{CC}$ = 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 or B | Y | $C_L$=15pF | 0.6 | 3.4 | 6.8 | 0.6 | 8.0 | 0.6 | 8.5 | ns |
| | | | $C_L$=50pF | 0.6 | 4.9 | 8.8 | 0.6 | 10.0 | 0.6 | 11.5 | ns |


© Diodes Incorporated

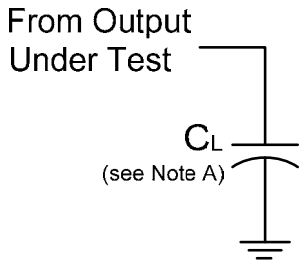
NEW PRODUCT

## Operating Characteristics

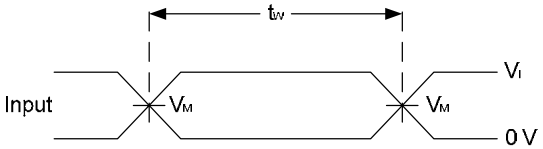
$T_A$ = 25 ºC

| Parameter | | Test Conditions | $V_{CC}$ = 5 V | Unit |
|---|---|---|---|---|
| | | | Typ. | |
| $C_{pd}$ | Power dissipation capacitance | f = 1 MHz<br>No Load | 12 | pF |

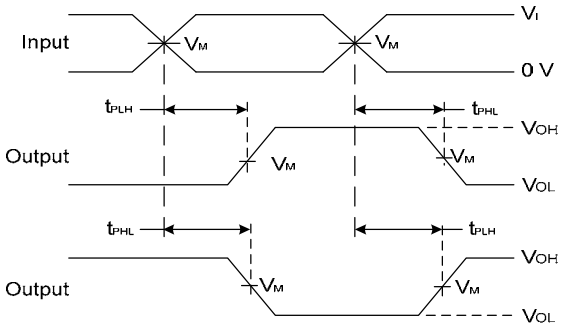
## Parameter Measurement Information




| $V_{CC}$ | Inputs | | $V_M$ | $C_L$ |
|---|---|---|---|---|
| | $V_I$ | $t_r/t_f$ | | |
| 3.3V±0.3V | $V_{CC}$ | ≤3ns | $V_{CC}/2$ | 15pF |
| 5V±0.5V | $V_{CC}$ | ≤3ns | $V_{CC}/2$ | 15pF |
| 3.3V±0.3V | $V_{CC}$ | ≤3ns | $V_{CC}/2$ | 50pF |
| 5V±0.5V | $V_{CC}$ | ≤3ns | $V_{CC}/2$ | 50pF |




**Voltage Waveform Pulse Duration**




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

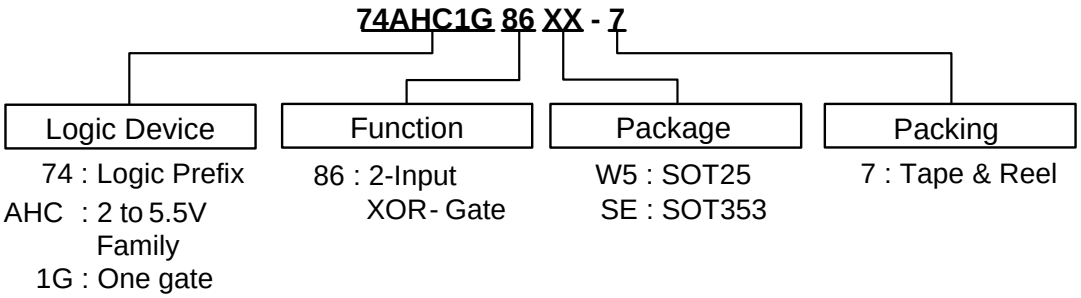
**Figure 1. Load Circuit and Voltage Waveforms**

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. $t_{PLH}$ and $t_{PHL}$ are the same as $t_{PD}$.


© Diodes Incorporated

NEW PRODUCT

## Ordering Information

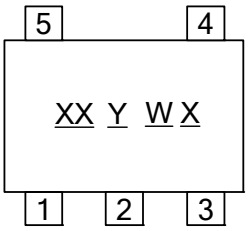



| Device | Package Code | Packaging (Note 5) | 7" Tape and Reel | |
|---|---|---|---|---|
| | | | Quantity | Part Number Suffix |
| 74AHC1G86W5-7 | W5 | SOT25 | 3000/Tape & Reel | -7 |
| 74AHC1G86SE-7 | SE | SOT353 | 3000/Tape & Reel | -7 |

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

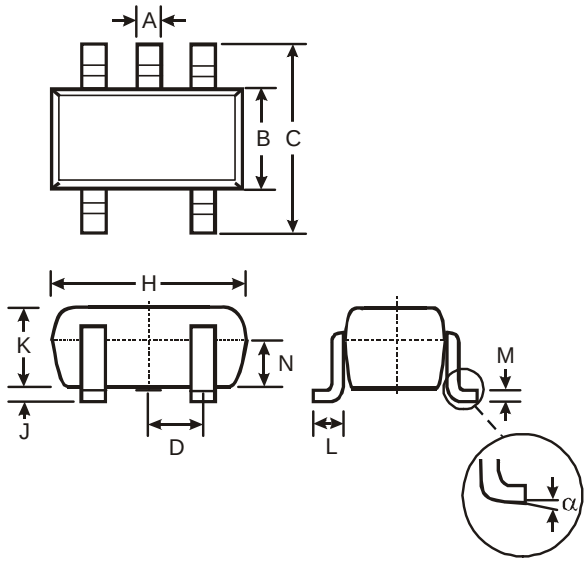
| Part Number | Package | Identification Code |
|---|---|---|
| 74AHC1G86W5 | SOT25 | YX |
| 74AHC1G86SE | SOT353 | YX |


© Diodes Incorporated

NEW PRODUCT

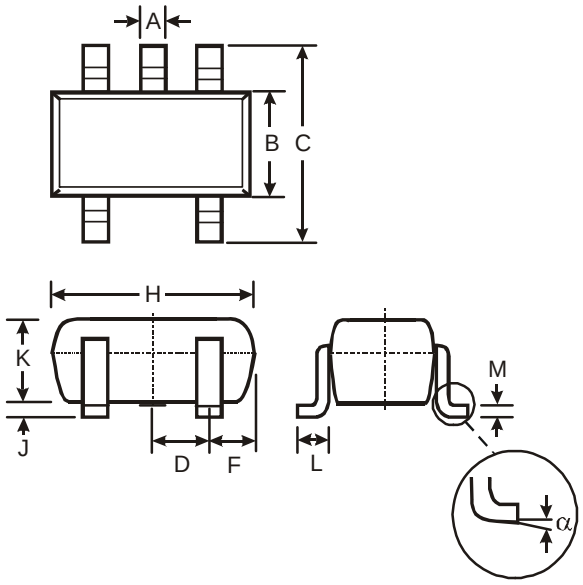
## Package Outline Dimensions (All Dimensions in mm)

### (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 | | |


© Diodes Incorporated

NEW PRODUCT

**IMPORTANT NOTICE**

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.
Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

**LIFE SUPPORT**

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or

2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2011, Diodes Incorporated

**www.diodes.com**