

# HD74LV2G66A

## 2-channel Analog Switch

REJ03D0095-0400Z  
(Previous ADE-205-566C (Z))  
Rev.4.00  
Sep.30 2003

### Description

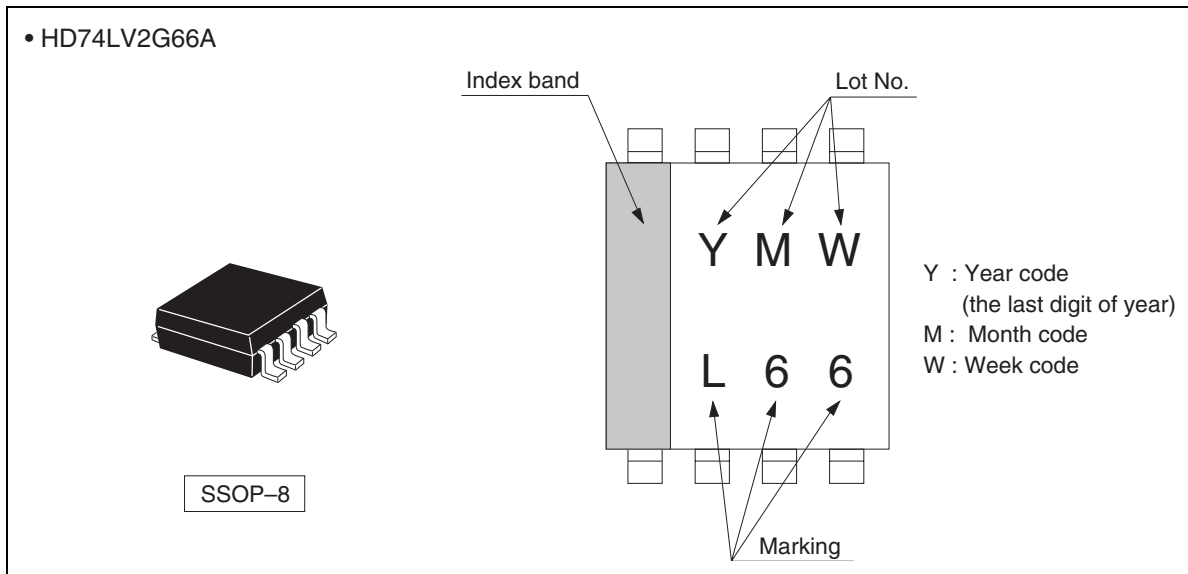
The HD74LV2G66A has 2-channel analog switch in an 8 pin package. Each switch section has its own enable input control (C). High-level voltage applied to C turns on the associated switch section. Applications include signal gating, chopping, modulation, or demodulation (modem), and signal multiplexing for analog to digital and digital to analog conversion systems. Low voltage and high-speed operation is suitable for the battery powered products (e.g., notebook computers), and the low power consumption extends the battery life.

### Features

- The basic gate function is lined up as Renesas uni logic series.
- Supplied on emboss taping for high-speed automatic mounting.
- Electrical characteristics equivalent to the HD74LV4066A  
Supply voltage range : 1.65 to 5.5 V  
Operating temperature range : -40 to +85°C
- Control inputs  $V_{IH}$  (Max.) = 5.5 V (@ $V_{CC}$  = 0 V to 5.5 V)
- Control inputs has hysteresis voltage for the slow transition.
- Ordering Information

| Part Name      | Package Type | Package Code | Package Abbreviation | Taping Abbreviation (Quantity) |
|----------------|--------------|--------------|----------------------|--------------------------------|
| HD74LV2G66AUSE | SSOP-8 pin   | TTP-8DBV     | US                   | E (3,000 pcs/reel)             |

## Outline and Article Indication

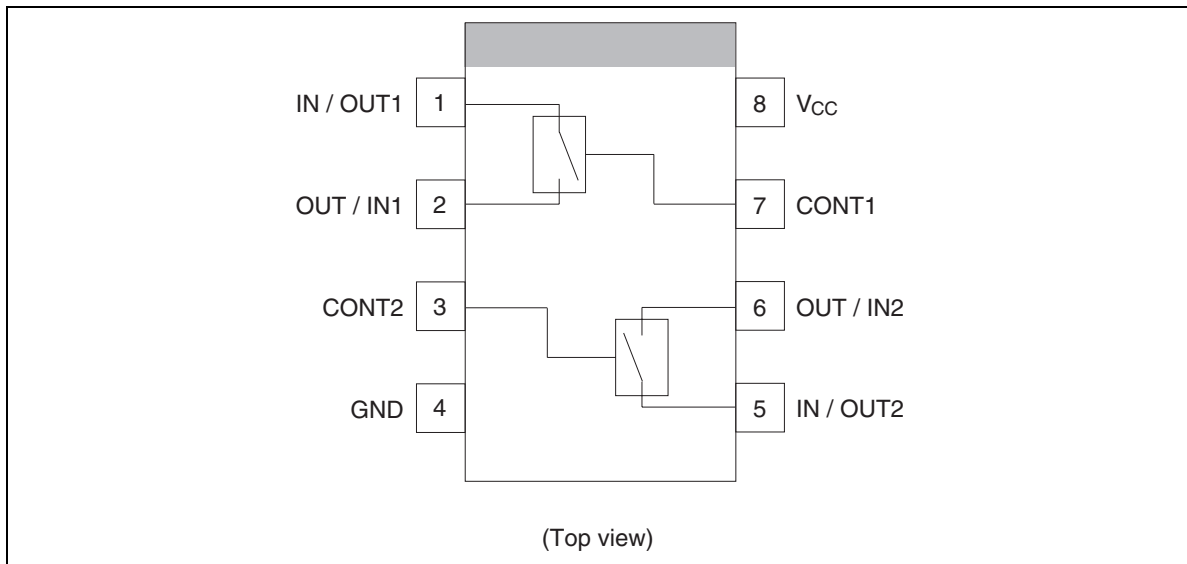


## Function Table

| Control | Switch |
|---------|--------|
| L       | OFF    |
| H       | ON     |

H : High level  
L : Low level

## Pin Arrangement



## Absolute Maximum Ratings

| Item                                                                               | Symbol                | Ratings                | Unit             | Test Conditions             |
|------------------------------------------------------------------------------------|-----------------------|------------------------|------------------|-----------------------------|
| Supply voltage range                                                               | $V_{CC}$              | -0.5 to 7.0            | V                |                             |
| Input voltage range <sup>*1</sup>                                                  | $V_I$                 | -0.5 to 7.0            | V                |                             |
| Output voltage range <sup>*1, 2</sup>                                              | $V_O$                 | -0.5 to $V_{CC} + 0.5$ | V                | Output : H or L             |
| Input clamp current                                                                | $I_{IK}$              | -20                    | mA               | $V_I < 0$                   |
| Output clamp current                                                               | $I_{OK}$              | $\pm 50$               | mA               | $V_O < 0$ or $V_O > V_{CC}$ |
| Continuous output current                                                          | $I_O$                 | $\pm 25$               | mA               | $V_O = 0$ to $V_{CC}$       |
| Continuous current through $V_{CC}$ or GND                                         | $I_{CC}$ or $I_{GND}$ | $\pm 50$               | mA               |                             |
| Maximum power dissipation at $T_a = 25^\circ\text{C}$ (in still air) <sup>*3</sup> | $P_T$                 | 200                    | mW               |                             |
| Storage temperature                                                                | $T_{stg}$             | -65 to 150             | $^\circ\text{C}$ |                             |

- Notes:
- The absolute maximum ratings are values, which must not individually be exceeded, and furthermore no two of which may be realized at the same time.
  - The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
  - This value is limited to 5.5 V maximum.
  - The maximum package power dissipation was calculated using a junction temperature of  $150^\circ\text{C}$ .

## Recommended Operating Conditions

| Item                                                     | Symbol   | Min  | Max      | Unit   | Conditions                  |
|----------------------------------------------------------|----------|------|----------|--------|-----------------------------|
| Supply voltage range                                     | $V_{CC}$ | 1.65 | 5.5      | V      |                             |
| Input voltage range                                      | $V_I$    | 0    | 5.5      | V      |                             |
| Input / output voltage range                             | $V_{IO}$ | 0    | $V_{CC}$ | V      |                             |
| Input transition rise or fall rate $\Delta t / \Delta v$ |          | 0    | 300      | ns / V | $V_{CC} = 1.65$ to $1.95$ V |
|                                                          |          | 0    | 200      |        | $V_{CC} = 2.3$ to $2.7$ V   |
|                                                          |          | 0    | 100      |        | $V_{CC} = 3.0$ to $3.6$ V   |
|                                                          |          | 0    | 20       |        | $V_{CC} = 4.5$ to $5.5$ V   |
| Operating free-air temperature                           | $T_a$    | -40  | 85       | °C     |                             |

Note: Unused or floating control inputs must be held high or low.

## Electrical Characteristic

| Item                                               | Symbol                | VCC (V)      | Ta = 25°C |     |      | Ta = -40 to 85°C      |      |                       | Unit | Test Conditions                                                                                                                                                   |
|----------------------------------------------------|-----------------------|--------------|-----------|-----|------|-----------------------|------|-----------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                    |                       |              | Min       | Typ | Max  | Min                   | Typ  | Max                   |      |                                                                                                                                                                   |
| Input voltage                                      | V <sub>IH</sub>       | 1.65 to 1.95 | —         | —   | —    | V <sub>CC</sub> ×0.75 | —    | —                     | V    | Control input only                                                                                                                                                |
|                                                    |                       | 2.3 to 2.7   | —         | —   | —    | V <sub>CC</sub> ×0.7  | —    | —                     |      |                                                                                                                                                                   |
|                                                    |                       | 3.0 to 3.6   | —         | —   | —    | V <sub>CC</sub> ×0.7  | —    | —                     |      |                                                                                                                                                                   |
|                                                    |                       | 4.5 to 5.5   | —         | —   | —    | V <sub>CC</sub> ×0.7  | —    | —                     |      |                                                                                                                                                                   |
|                                                    | V <sub>IL</sub>       | 1.65 to 1.95 | —         | —   | —    | —                     | —    | V <sub>CC</sub> ×0.25 |      |                                                                                                                                                                   |
|                                                    |                       | 2.3 to 2.7   | —         | —   | —    | —                     | —    | V <sub>CC</sub> ×0.3  |      |                                                                                                                                                                   |
|                                                    |                       | 3.0 to 3.6   | —         | —   | —    | —                     | —    | V <sub>CC</sub> ×0.3  |      |                                                                                                                                                                   |
|                                                    |                       | 4.5 to 5.5   | —         | —   | —    | —                     | —    | V <sub>CC</sub> ×0.3  |      |                                                                                                                                                                   |
| Hysteresis voltage                                 | V <sub>H</sub>        | 1.8          | —         | —   | —    | —                     | 0.25 | —                     | V    | V <sub>T</sub> <sup>+</sup> - V <sub>T</sub> <sup>-</sup>                                                                                                         |
|                                                    |                       | 2.5          | —         | —   | —    | —                     | 0.30 | —                     |      |                                                                                                                                                                   |
|                                                    |                       | 3.3          | —         | —   | —    | —                     | 0.35 | —                     |      |                                                                                                                                                                   |
|                                                    |                       | 5.0          | —         | —   | —    | —                     | 0.45 | —                     |      |                                                                                                                                                                   |
| On-state switch resistance                         | R <sub>ON</sub>       | 1.65         | —         | 120 | 360  | —                     | —    | 450                   | Ω    | V <sub>IN</sub> = V <sub>CC</sub> or GND<br>V <sub>C</sub> = V <sub>IH</sub><br>I <sub>T</sub> = 1 mA                                                             |
|                                                    |                       | 2.3          | —         | 60  | 180  | —                     | —    | 225                   |      |                                                                                                                                                                   |
|                                                    |                       | 3.0          | —         | 50  | 150  | —                     | —    | 190                   |      |                                                                                                                                                                   |
|                                                    |                       | 4.5          | —         | 40  | 75   | —                     | —    | 100                   |      |                                                                                                                                                                   |
| Peak on resistance                                 | R <sub>ON(P)</sub>    | 1.65         | —         | 400 | 1100 | —                     | —    | 1400                  | Ω    | V <sub>IN</sub> = V <sub>CC</sub> to GND<br>V <sub>C</sub> = V <sub>IH</sub><br>I <sub>T</sub> = 1 mA                                                             |
|                                                    |                       | 2.3          | —         | 200 | 500  | —                     | —    | 600                   |      |                                                                                                                                                                   |
|                                                    |                       | 3.0          | —         | 90  | 180  | —                     | —    | 225                   |      |                                                                                                                                                                   |
|                                                    |                       | 4.5          | —         | 50  | 100  | —                     | —    | 125                   |      |                                                                                                                                                                   |
| Difference of on-state resistance between switches | ΔR <sub>ON</sub>      | 1.65         | —         | 40  | 120  | —                     | —    | 160                   | Ω    | V <sub>IN</sub> = V <sub>CC</sub> to GND<br>V <sub>C</sub> = V <sub>IH</sub><br>I <sub>T</sub> = 1 mA                                                             |
|                                                    |                       | 2.3          | —         | 20  | 30   | —                     | —    | 40                    |      |                                                                                                                                                                   |
|                                                    |                       | 3.0          | —         | 10  | 20   | —                     | —    | 30                    |      |                                                                                                                                                                   |
|                                                    |                       | 4.5          | —         | 7   | 15   | —                     | —    | 20                    |      |                                                                                                                                                                   |
| Off-state switch leakage current                   | I <sub>S(OFF)</sub>   | 5.5          | —         | —   | ±0.1 | —                     | —    | ±1.0                  | μA   | V <sub>IN</sub> = V <sub>CC</sub> ,<br>V <sub>OUT</sub> = GND<br>or V <sub>IN</sub> = GND,<br>V <sub>O</sub> = V <sub>CC</sub> , V <sub>C</sub> = V <sub>IL</sub> |
| On-state switch leakage current                    | I <sub>S(ON)</sub>    | 5.5          | —         | —   | ±0.1 | —                     | —    | ±1.0                  | μA   | V <sub>IN</sub> = V <sub>CC</sub> or GND<br>V <sub>C</sub> = V <sub>IH</sub>                                                                                      |
| Input current                                      | I <sub>IN</sub>       | 0 to 5.5     | —         | —   | ±0.1 | —                     | —    | ±1.0                  | μA   | V <sub>IN</sub> = 5.5 V or GND                                                                                                                                    |
| Quiescent supply current                           | I <sub>CC</sub>       | 5.5          | —         | —   | —    | —                     | —    | 10                    | μA   | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                                                                                          |
| Control input capacitance                          | C <sub>IC</sub>       | —            | —         | 3.5 | —    | —                     | —    | —                     | pF   |                                                                                                                                                                   |
| Switch terminal capacitance                        | C <sub>IN / OUT</sub> | —            | —         | 4.0 | —    | —                     | —    | —                     | pF   |                                                                                                                                                                   |
| Feed through capacitance                           | C <sub>IN-OUT</sub>   | —            | —         | 0.5 | —    | —                     | —    | —                     | pF   |                                                                                                                                                                   |

## Switching Characteristics

- $V_{CC} = 1.8 \pm 0.15 \text{ V}$

| Item                   | Symbol    | $T_a = 25^\circ\text{C}$ |      |      | $T_a = -40 \text{ to } 85^\circ\text{C}$ |      | Unit | Test Conditions       | FROM (Input)     | TO (Output)      |
|------------------------|-----------|--------------------------|------|------|------------------------------------------|------|------|-----------------------|------------------|------------------|
|                        |           | Min                      | Typ  | Max  | Min                                      | Max  |      |                       |                  |                  |
| Propagation delay time | $t_{PLH}$ | —                        | 4.0  | 13.0 | —                                        | 19.0 | ns   | $C_L = 15 \text{ pF}$ | IN/OUT or OUT/IN | OUT/IN or IN/OUT |
|                        | $t_{PHL}$ | —                        | 11.0 | 23.0 | —                                        | 29.0 |      | $C_L = 50 \text{ pF}$ |                  |                  |
| Enable time            | $t_{ZH}$  | —                        | 11.0 | 24.0 | —                                        | 29.0 | ns   | $C_L = 15 \text{ pF}$ | C                | IN/OUT or OUT/IN |
|                        | $t_{ZL}$  | —                        | 18.0 | 44.0 | —                                        | 51.0 |      | $C_L = 50 \text{ pF}$ |                  |                  |
| Disable time           | $t_{HZ}$  | —                        | 11.0 | 21.0 | —                                        | 29.0 | ns   | $C_L = 15 \text{ pF}$ | C                | IN/OUT or OUT/IN |
|                        | $t_{LZ}$  | —                        | 18.0 | 46.0 | —                                        | 53.0 |      | $C_L = 50 \text{ pF}$ |                  |                  |

- $V_{CC} = 2.5 \pm 0.2 \text{ V}$

| Item                   | Symbol    | $T_a = 25^\circ\text{C}$ |      |      | $T_a = -40 \text{ to } 85^\circ\text{C}$ |      | Unit | Test Conditions       | FROM (Input)     | TO (Output)      |
|------------------------|-----------|--------------------------|------|------|------------------------------------------|------|------|-----------------------|------------------|------------------|
|                        |           | Min                      | Typ  | Max  | Min                                      | Max  |      |                       |                  |                  |
| Propagation delay time | $t_{PLH}$ | —                        | 2.0  | 10.0 | —                                        | 16.0 | ns   | $C_L = 15 \text{ pF}$ | IN/OUT or OUT/IN | OUT/IN or IN/OUT |
|                        | $t_{PHL}$ | —                        | 5.0  | 12.0 | —                                        | 18.0 |      | $C_L = 50 \text{ pF}$ |                  |                  |
| Enable time            | $t_{ZH}$  | —                        | 6.0  | 15.0 | —                                        | 20.0 | ns   | $C_L = 15 \text{ pF}$ | C                | IN/OUT or OUT/IN |
|                        | $t_{ZL}$  | —                        | 8.0  | 25.0 | —                                        | 32.0 |      | $C_L = 50 \text{ pF}$ |                  |                  |
| Disable time           | $t_{HZ}$  | —                        | 7.0  | 15.0 | —                                        | 23.0 | ns   | $C_L = 15 \text{ pF}$ | C                | IN/OUT or OUT/IN |
|                        | $t_{LZ}$  | —                        | 11.0 | 25.0 | —                                        | 32.0 |      | $C_L = 50 \text{ pF}$ |                  |                  |

- $V_{CC} = 3.3 \pm 0.3 \text{ V}$

| Item                   | Symbol    | $T_a = 25^\circ\text{C}$ |     |      | $T_a = -40 \text{ to } 85^\circ\text{C}$ |      | Unit | Test Conditions       | FROM (Input)     | TO (Output)      |
|------------------------|-----------|--------------------------|-----|------|------------------------------------------|------|------|-----------------------|------------------|------------------|
|                        |           | Min                      | Typ | Max  | Min                                      | Max  |      |                       |                  |                  |
| Propagation delay time | $t_{PLH}$ | —                        | 1.5 | 6.0  | —                                        | 10.0 | ns   | $C_L = 15 \text{ pF}$ | IN/OUT or OUT/IN | OUT/IN or IN/OUT |
|                        | $t_{PHL}$ | —                        | 4.0 | 9.0  | —                                        | 12.0 |      | $C_L = 50 \text{ pF}$ |                  |                  |
| Enable time            | $t_{ZH}$  | —                        | 4.0 | 11.0 | —                                        | 15.0 | ns   | $C_L = 15 \text{ pF}$ | C                | IN/OUT or OUT/IN |
|                        | $t_{ZL}$  | —                        | 6.0 | 18.0 | —                                        | 22.0 |      | $C_L = 50 \text{ pF}$ |                  |                  |
| Disable time           | $t_{HZ}$  | —                        | 5.0 | 11.0 | —                                        | 15.0 | ns   | $C_L = 15 \text{ pF}$ | C                | IN/OUT or OUT/IN |
|                        | $t_{LZ}$  | —                        | 8.0 | 18.0 | —                                        | 22.0 |      | $C_L = 50 \text{ pF}$ |                  |                  |

**Switching Characteristics (cont)**

- $V_{CC} = 5.0 \pm 0.5 \text{ V}$

| Item                   | Symbol    | $T_a = 25^\circ\text{C}$ |     |      | $T_a = -40 \text{ to } 85^\circ\text{C}$ |      | Unit | Test Conditions       | FROM (Input)     | TO (Output)      |
|------------------------|-----------|--------------------------|-----|------|------------------------------------------|------|------|-----------------------|------------------|------------------|
|                        |           | Min                      | Typ | Max  | Min                                      | Max  |      |                       |                  |                  |
| Propagation delay time | $t_{PLH}$ | —                        | 1.0 | 4.0  | —                                        | 7.0  | ns   | $C_L = 15 \text{ pF}$ | IN/OUT or OUT/IN | OUT/IN or IN/OUT |
|                        | $t_{PHL}$ | —                        | 3.0 | 6.0  | —                                        | 8.0  |      | $C_L = 50 \text{ pF}$ |                  |                  |
| Enable time            | $t_{ZH}$  | —                        | 3.0 | 7.0  | —                                        | 10.0 | ns   | $C_L = 15 \text{ pF}$ | C                | IN/OUT or OUT/IN |
|                        | $t_{ZL}$  | —                        | 5.0 | 12.0 | —                                        | 16.0 |      | $C_L = 50 \text{ pF}$ |                  |                  |
| Disable time           | $t_{HZ}$  | —                        | 4.0 | 7.0  | —                                        | 10.0 | ns   | $C_L = 15 \text{ pF}$ | C                | IN/OUT or OUT/IN |
|                        | $t_{LZ}$  | —                        | 6.0 | 12.0 | —                                        | 16.0 |      | $C_L = 50 \text{ pF}$ |                  |                  |

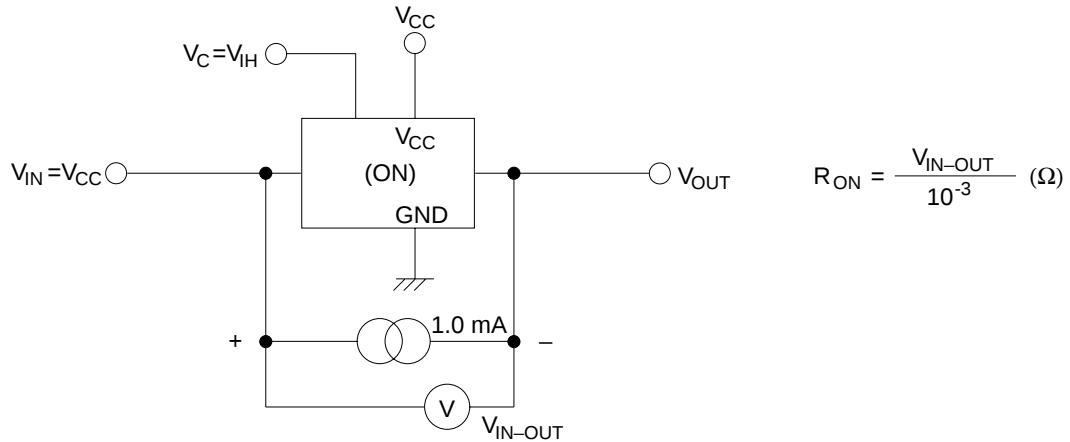
**Operating Characteristics**

- $C_L = 50 \text{ pF}$

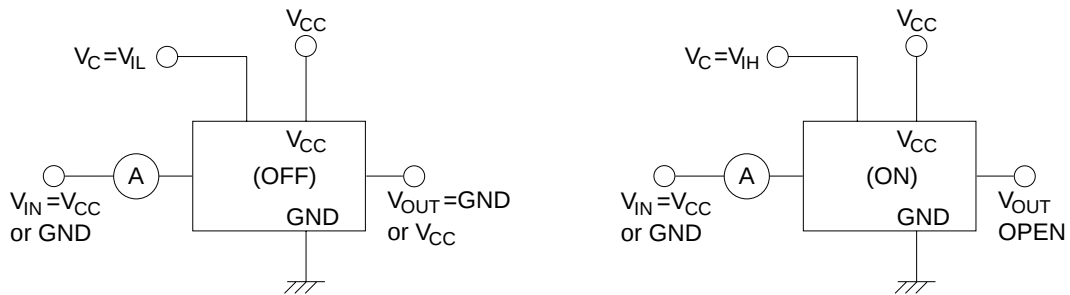
| Item                          | Symbol   | $V_{CC} \text{ (V)}$ | $T_a = 25^\circ\text{C}$ |     |     | Unit | Test Conditions      |
|-------------------------------|----------|----------------------|--------------------------|-----|-----|------|----------------------|
|                               |          |                      | Min                      | Typ | Max |      |                      |
| Power dissipation capacitance | $C_{PD}$ | 3.3                  | —                        | 3.5 | —   | pF   | $f = 10 \text{ MHz}$ |
|                               |          | 5.0                  | —                        | 4.0 | —   |      |                      |

## Test Circuit

•  $R_{ON}$

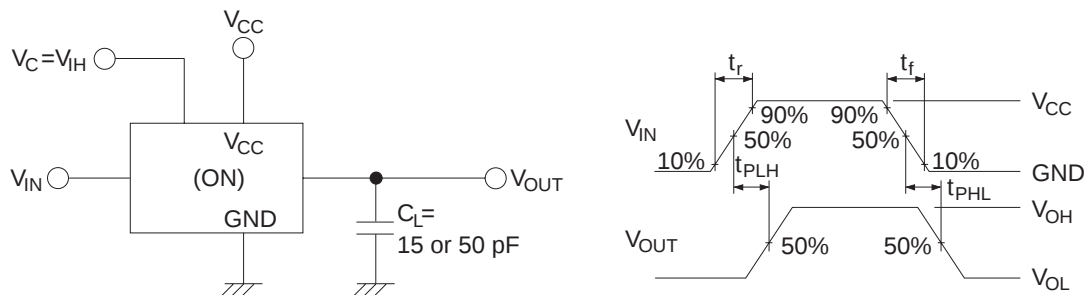


•  $I_S$  (off),  $I_S$  (on)



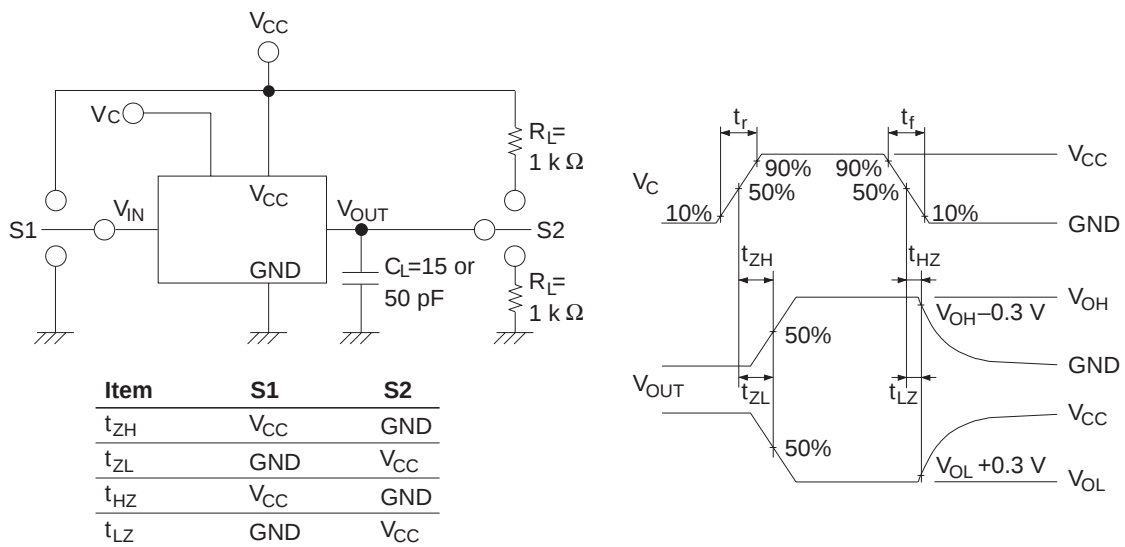
## HD74LV2G66A

### • $t_{PLH}$ , $t_{PHL}$



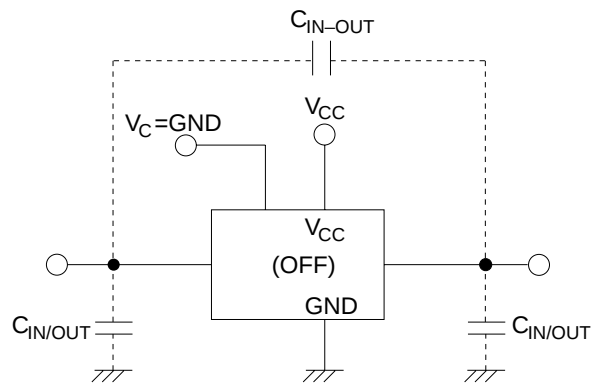
- Notes: 1. Input waveform :  $PRR \leq 1$  MHz,  $Z_o = 50 \Omega$ ,  $t_r \leq 3$  ns,  $t_f \leq 3$  ns.  
2. The output are measured one at a time with one transition per measurement.

### • $t_{ZH}$ , $t_{ZL}$ / $t_{HZ}$ , $t_{LZ}$



- Notes: 1. Input waveform :  $PRR \leq 1$  MHz,  $Z_o = 50 \Omega$ ,  $t_r \leq 3$  ns,  $t_f \leq 3$  ns.  
2. Waveform – A is for an output with internal conditions such that the output is low except when disabled by the output control.  
3. Waveform – B is for an output with internal conditions such that the output is high except when disabled by the output control.  
4. The output are measured one at a time with one transition per measurement.

- $C_{IN/OUT}$ ,  $C_{IN-OUT}$





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