

# HD74LV1G66A

## Analog Switch

REJ03D0069-0700

Rev.7.00

Mar 21, 2008

### Description

The HD74LV1G66A has an analog switch in a 5 pin package. Switch section has its enable input control (C). High-level voltage applied to C turns on the 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.

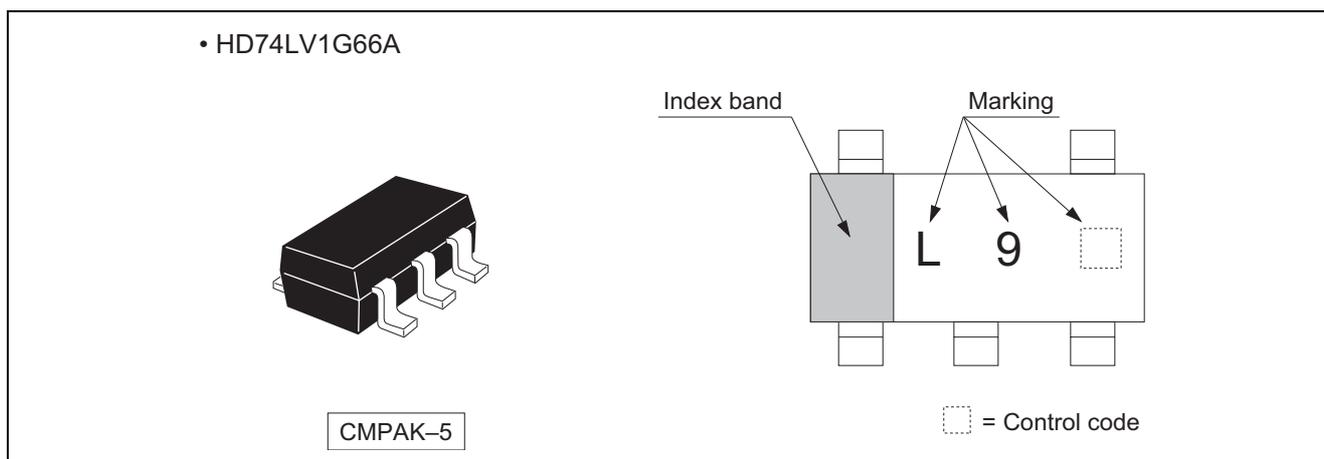
### Features

- 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

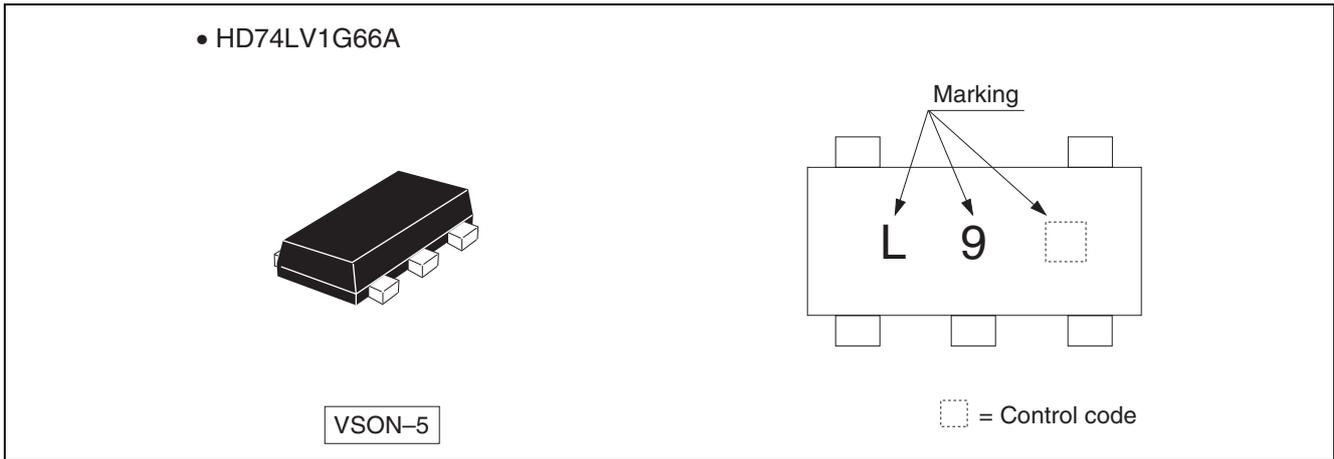
| Part Name      | Package Type | Package Code (Previous Code) | Package Abbreviation | Taping Abbreviation (Quantity) |
|----------------|--------------|------------------------------|----------------------|--------------------------------|
| HD74LV1G66ACME | CMPAK-5 pin  | PTSP0005ZC-A (CMPAK-5V)      | CM                   | E (3000 pcs/reel)              |
| HD74LV1G66AVSE | VSON-5 pin   | PUSN0005KA-A (TNP-5DV)       | VS                   | E (3000 pcs/reel)              |

Note: Please consult the sales office for the above package availability.

### Outline and Article Indication



Outline and Article Indication



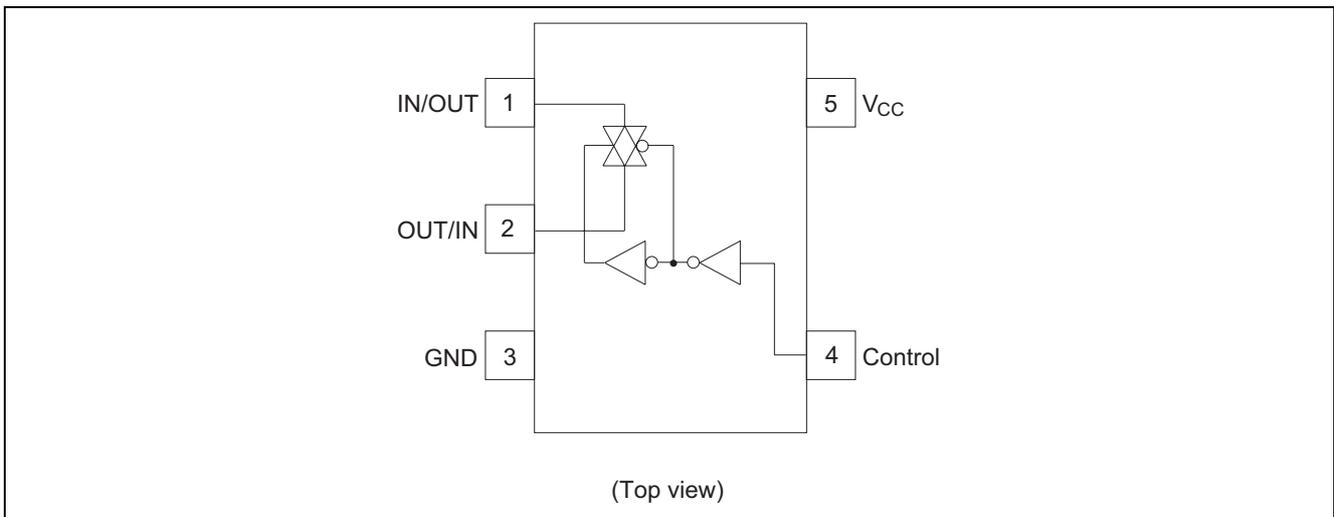
Function Table

| 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.

1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
2. This value is limited to 5.5 V maximum.
3. 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       | $V_{I/O}$             | 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       | $^\circ\text{C}$ |                             |

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

**Electrical Characteristics**

| Item                             | Symbol              | V <sub>CC</sub> (V) | T <sub>a</sub> = 25°C |     |      | T <sub>a</sub> = -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                | —                     | 700 | 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                 | —                     | 250 | 500  | —                            | —    | 600                   |      |   |
|                                  |                     | 3.0                 | —                     | 100 | 180  | —                            | —    | 225                   |      |   |
|                                  |                     | 4.5                 | —                     | 50  | 100  | —                            | —    | 125                   |      |   |
| 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

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

| Item                   | Symbol           | Ta = 25°C |      |      | Ta = -40 to 85°C |      | Unit | Test Conditions        | FROM (Input)     | TO (Output)      |
|------------------------|------------------|-----------|------|------|------------------|------|------|------------------------|------------------|------------------|
|                        |                  | Min       | Typ  | Max  | Min              | Max  |      |                        |                  |                  |
| Propagation delay time | t <sub>PLH</sub> | —         | 4.0  | 13.0 | —                | 19.0 | ns   | C <sub>L</sub> = 15 pF | IN/OUT or OUT/IN | OUT/IN or IN/OUT |
|                        | t <sub>PHL</sub> | —         | 11.0 | 23.0 | —                | 29.0 |      | C <sub>L</sub> = 50 pF |                  |                  |
| Enable time            | t <sub>ZH</sub>  | —         | 11.0 | 24.0 | —                | 29.0 | ns   | C <sub>L</sub> = 15 pF | C                | IN/OUT or OUT/IN |
|                        | t <sub>ZL</sub>  | —         | 18.0 | 44.0 | —                | 51.0 |      | C <sub>L</sub> = 50 pF |                  |                  |
| Disable time           | t <sub>HZ</sub>  | —         | 11.0 | 21.0 | —                | 29.0 | ns   | C <sub>L</sub> = 15 pF | C                | IN/OUT or OUT/IN |
|                        | t <sub>LZ</sub>  | —         | 18.0 | 46.0 | —                | 53.0 |      | C <sub>L</sub> = 50 pF |                  |                  |

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

| Item                   | Symbol           | Ta = 25°C |      |      | Ta = -40 to 85°C |      | Unit | Test Conditions        | FROM (Input)     | TO (Output)      |
|------------------------|------------------|-----------|------|------|------------------|------|------|------------------------|------------------|------------------|
|                        |                  | Min       | Typ  | Max  | Min              | Max  |      |                        |                  |                  |
| Propagation delay time | t <sub>PLH</sub> | —         | 2.0  | 10.0 | —                | 16.0 | ns   | C <sub>L</sub> = 15 pF | IN/OUT or OUT/IN | OUT/IN or IN/OUT |
|                        | t <sub>PHL</sub> | —         | 5.0  | 12.0 | —                | 18.0 |      | C <sub>L</sub> = 50 pF |                  |                  |
| Enable time            | t <sub>ZH</sub>  | —         | 6.0  | 15.0 | —                | 20.0 | ns   | C <sub>L</sub> = 15 pF | C                | IN/OUT or OUT/IN |
|                        | t <sub>ZL</sub>  | —         | 8.0  | 25.0 | —                | 32.0 |      | C <sub>L</sub> = 50 pF |                  |                  |
| Disable time           | t <sub>HZ</sub>  | —         | 7.0  | 15.0 | —                | 23.0 | ns   | C <sub>L</sub> = 15 pF | C                | IN/OUT or OUT/IN |
|                        | t <sub>LZ</sub>  | —         | 11.0 | 25.0 | —                | 32.0 |      | C <sub>L</sub> = 50 pF |                  |                  |

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

| Item                   | Symbol           | Ta = 25°C |     |      | Ta = -40 to 85°C |      | Unit | Test Conditions        | FROM (Input)     | TO (Output)      |
|------------------------|------------------|-----------|-----|------|------------------|------|------|------------------------|------------------|------------------|
|                        |                  | Min       | Typ | Max  | Min              | Max  |      |                        |                  |                  |
| Propagation delay time | t <sub>PLH</sub> | —         | 1.5 | 6.0  | —                | 10.0 | ns   | C <sub>L</sub> = 15 pF | IN/OUT or OUT/IN | OUT/IN or IN/OUT |
|                        | t <sub>PHL</sub> | —         | 4.0 | 9.0  | —                | 12.0 |      | C <sub>L</sub> = 50 pF |                  |                  |
| Enable time            | t <sub>ZH</sub>  | —         | 4.0 | 11.0 | —                | 15.0 | ns   | C <sub>L</sub> = 15 pF | C                | IN/OUT or OUT/IN |
|                        | t <sub>ZL</sub>  | —         | 6.0 | 18.0 | —                | 22.0 |      | C <sub>L</sub> = 50 pF |                  |                  |
| Disable time           | t <sub>HZ</sub>  | —         | 5.0 | 11.0 | —                | 15.0 | ns   | C <sub>L</sub> = 15 pF | C                | IN/OUT or OUT/IN |
|                        | t <sub>LZ</sub>  | —         | 8.0 | 18.0 | —                | 22.0 |      | C <sub>L</sub> = 50 pF |                  |                  |

### Switching Characteristics (cont)

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

| Item                   | Symbol           | Ta = 25°C |     |      | Ta = -40 to 85°C |      | Unit | Test Conditions        | FROM (Input)     | TO (Output)      |
|------------------------|------------------|-----------|-----|------|------------------|------|------|------------------------|------------------|------------------|
|                        |                  | Min       | Typ | Max  | Min              | Max  |      |                        |                  |                  |
| Propagation delay time | t <sub>PLH</sub> | —         | 1.0 | 4.0  | —                | 7.0  | ns   | C <sub>L</sub> = 15 pF | IN/OUT or OUT/IN | OUT/IN or IN/OUT |
|                        | t <sub>PHL</sub> | —         | 3.0 | 6.0  | —                | 8.0  |      | C <sub>L</sub> = 50 pF |                  |                  |
| Enable time            | t <sub>ZH</sub>  | —         | 3.0 | 7.0  | —                | 10.0 | ns   | C <sub>L</sub> = 15 pF | C                | IN/OUT or OUT/IN |
|                        | t <sub>ZL</sub>  | —         | 5.0 | 12.0 | —                | 16.0 |      | C <sub>L</sub> = 50 pF |                  |                  |
| Disable time           | t <sub>HZ</sub>  | —         | 4.0 | 7.0  | —                | 10.0 | ns   | C <sub>L</sub> = 15 pF | C                | IN/OUT or OUT/IN |
|                        | t <sub>LZ</sub>  | —         | 6.0 | 12.0 | —                | 16.0 |      | C <sub>L</sub> = 50 pF |                  |                  |

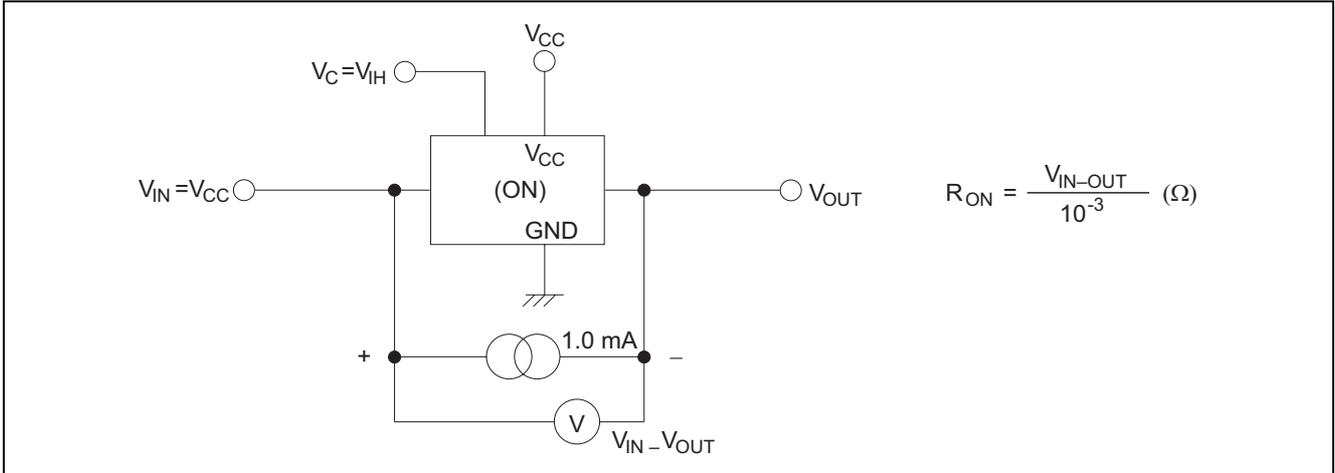
### Operating Characteristics

- C<sub>L</sub> = 50 pF

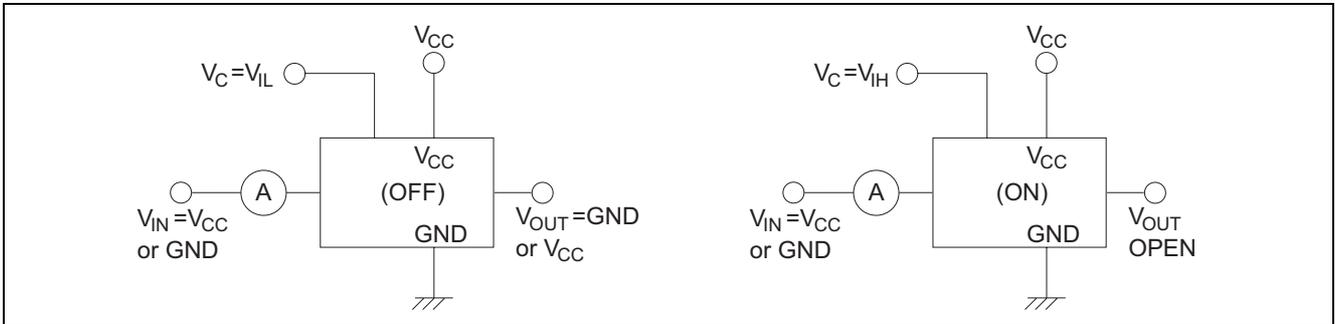
| Item                          | Symbol          | V <sub>CC</sub> (V) | Ta = 25°C |     |     | Unit | Test Conditions |
|-------------------------------|-----------------|---------------------|-----------|-----|-----|------|-----------------|
|                               |                 |                     | Min       | Typ | Max |      |                 |
| Power dissipation capacitance | C <sub>PD</sub> | 3.3                 | —         | 3.5 | —   | pF   | f = 10 MHz      |
|                               |                 | 5.0                 | —         | 4.0 | —   |      |                 |

Test Circuit

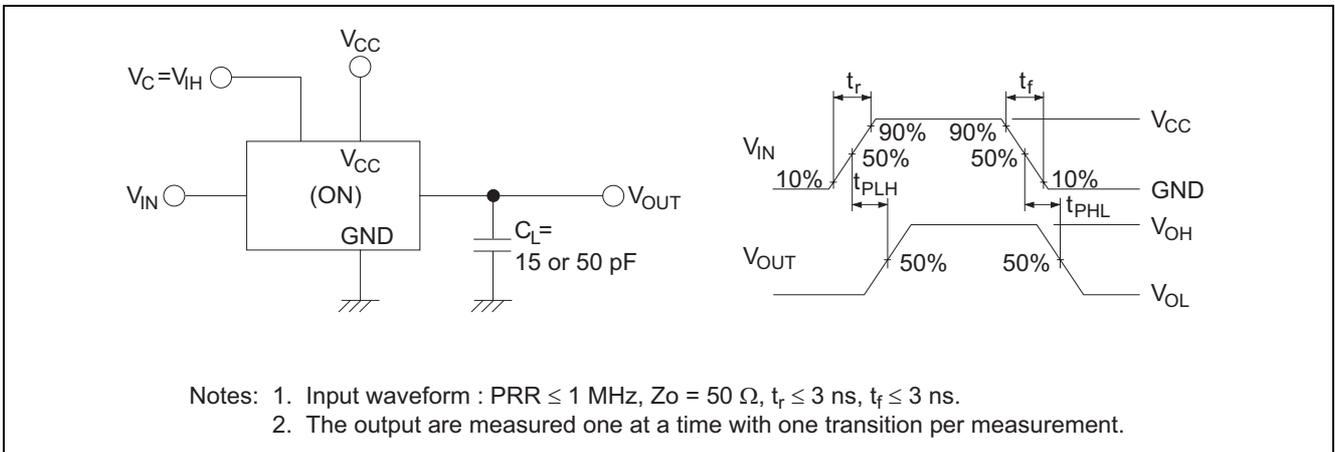
- $R_{ON}$



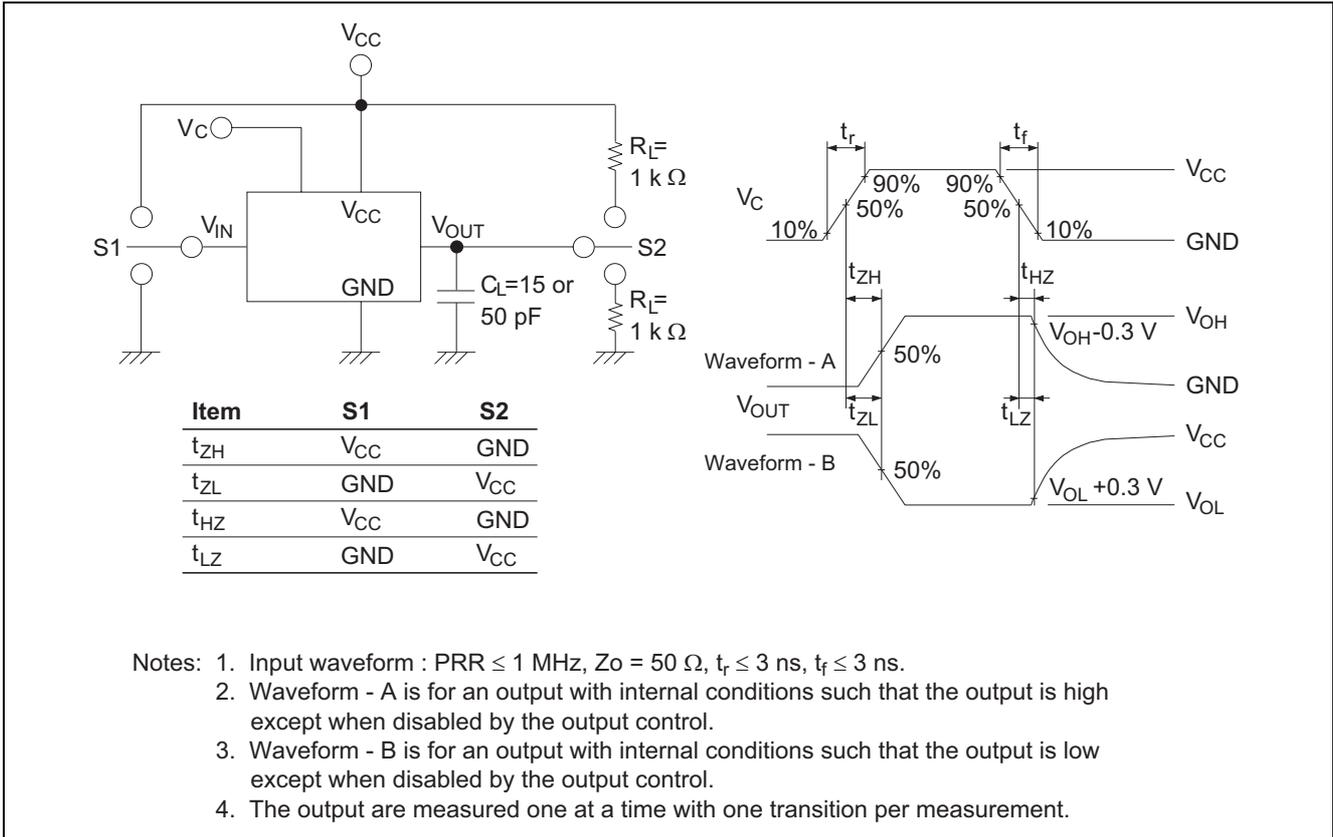
- $I_{S(off)}$ ,  $I_{S(on)}$



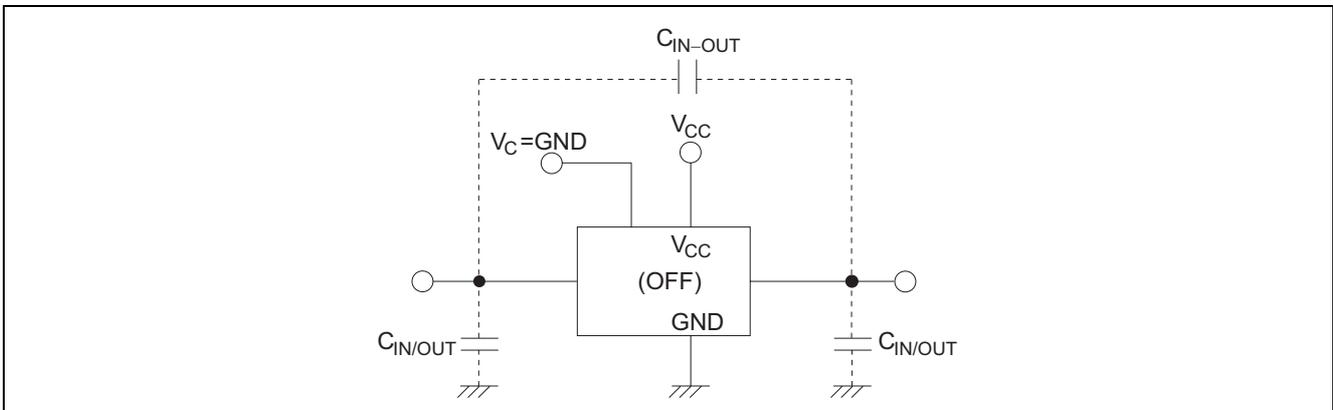
- $t_{PLH}$ ,  $t_{PHL}$



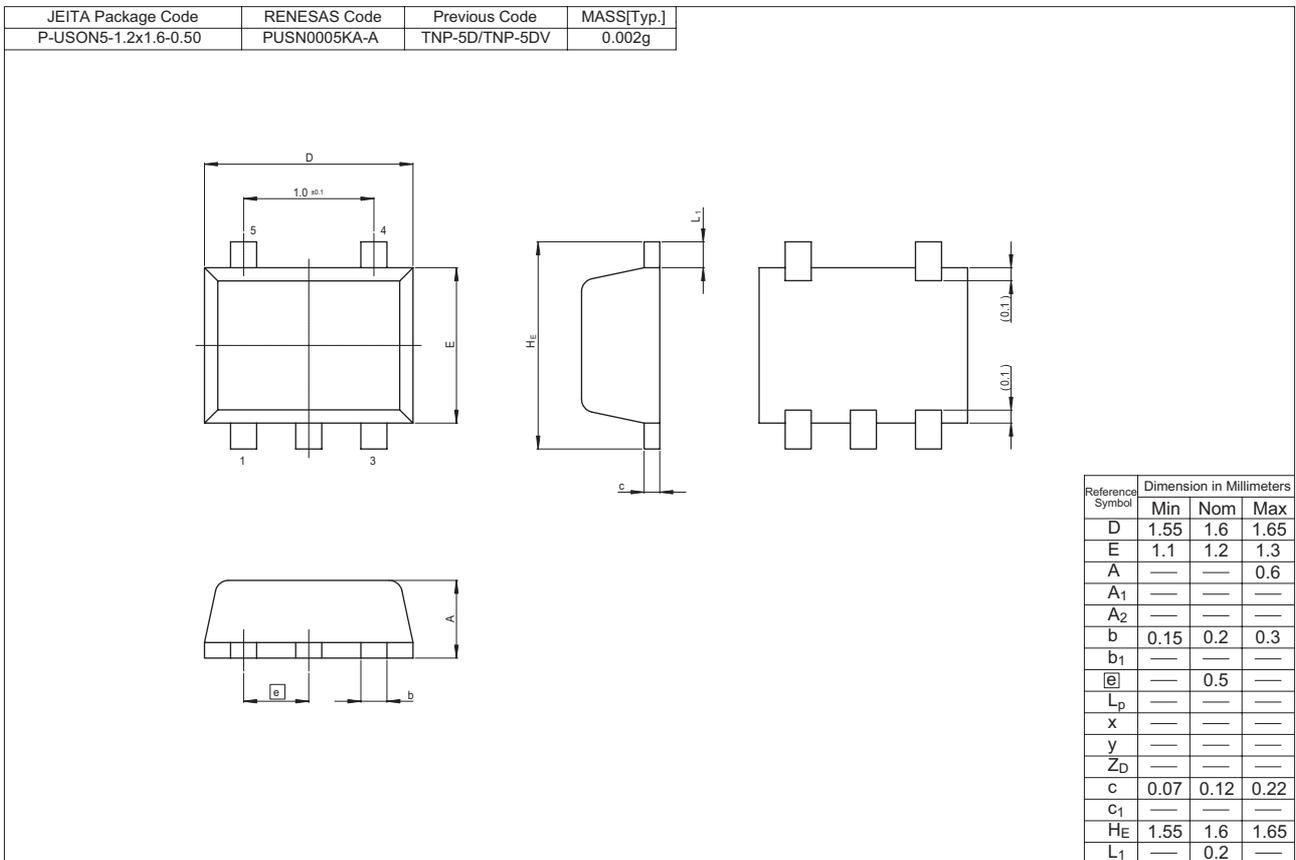
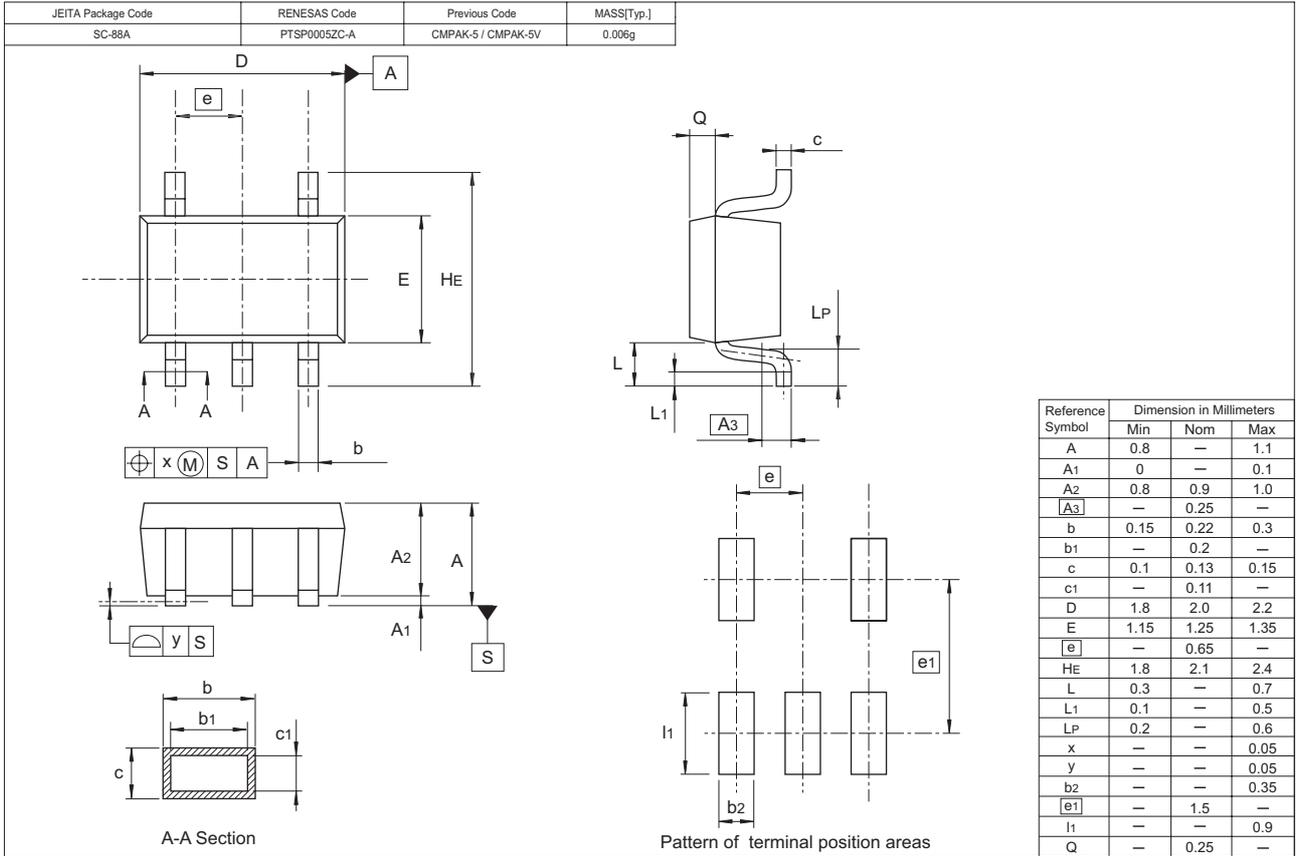
- $t_{ZH}, t_{ZL} / t_{HZ}, t_{LZ}$



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



Package Dimensions



Notes:

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