

# 74HC367; 74HCT367

Hex buffer/line driver; 3-state

Rev. 4 — 24 February 2021

Product data sheet

## 1. General description

The 74HC367; 74HCT367 is a hex buffer/line driver with 3-state outputs controlled by the output enable inputs ( $n\overline{OE}$ ). A HIGH on  $n\overline{OE}$  causes the outputs to assume a high impedance OFF-state. Inputs include clamp diodes. It enables the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ .

## 2. Features and benefits

- Wide supply voltage range from 2.0 V to 6.0 V
- CMOS low power dissipation
- High noise immunity
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level B
- Complies with JEDEC standards:
  - JESD8C (2.7 V to 3.6 V)
  - JESD7A (2.0 V to 6.0 V)
- 3-state outputs
- Input levels:
  - For 74HC367: CMOS level
  - For 74HCT367: TTL level
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

## 3. Ordering information

Table 1. Ordering information

| Type number | Package           |         |  |          |
|-------------|-------------------|---------|--|----------|
|             | Temperature range | Name    | Description  | Version  |
| 74HC367D    | -40 °C to +125 °C | SO16    | plastic small outline package; 16 leads; body width 3.9 mm             | SOT109-1 |
| 74HCT367D   |                   |         |  |          |
| 74HC367PW   | -40 °C to +125 °C | TSSOP16 | plastic thin shrink small outline package; 16 leads; body width 4.4 mm | SOT403-1 |
| 74HCT367PW  |                   |         |  |          |

4. Functional diagram

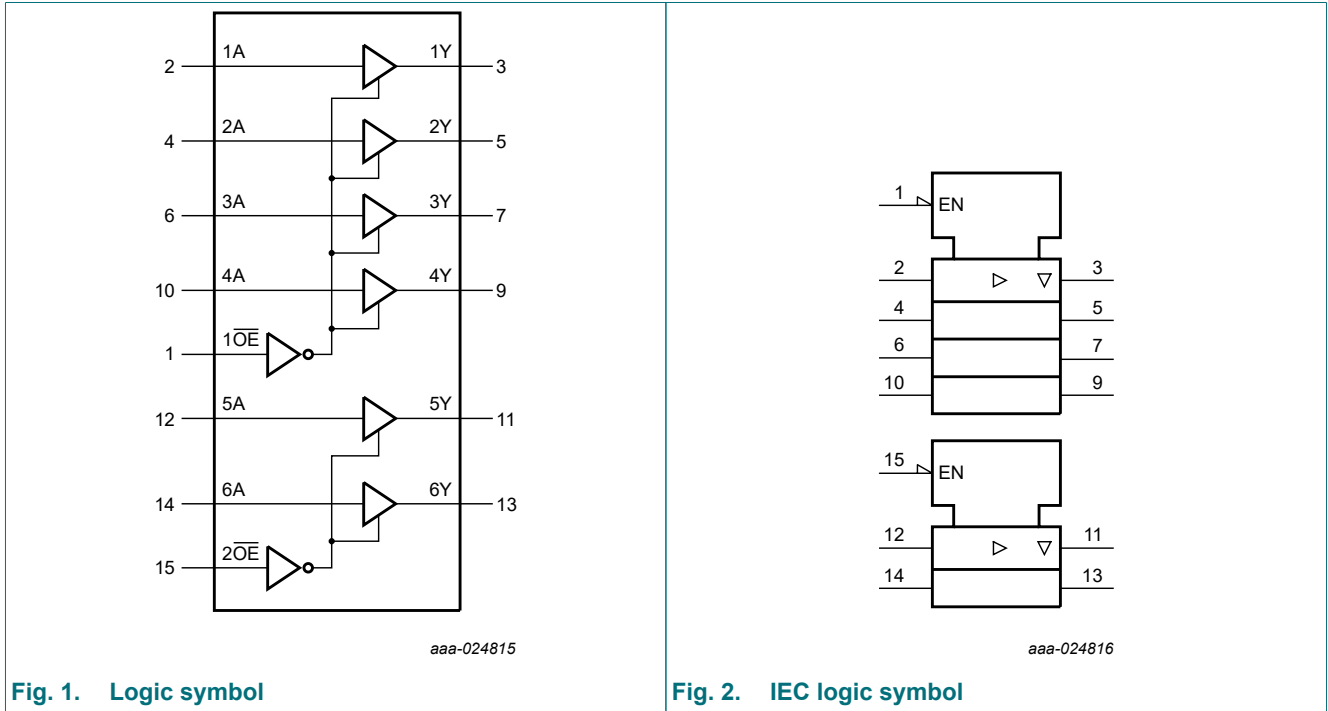


Fig. 1. Logic symbol

Fig. 2. IEC logic symbol

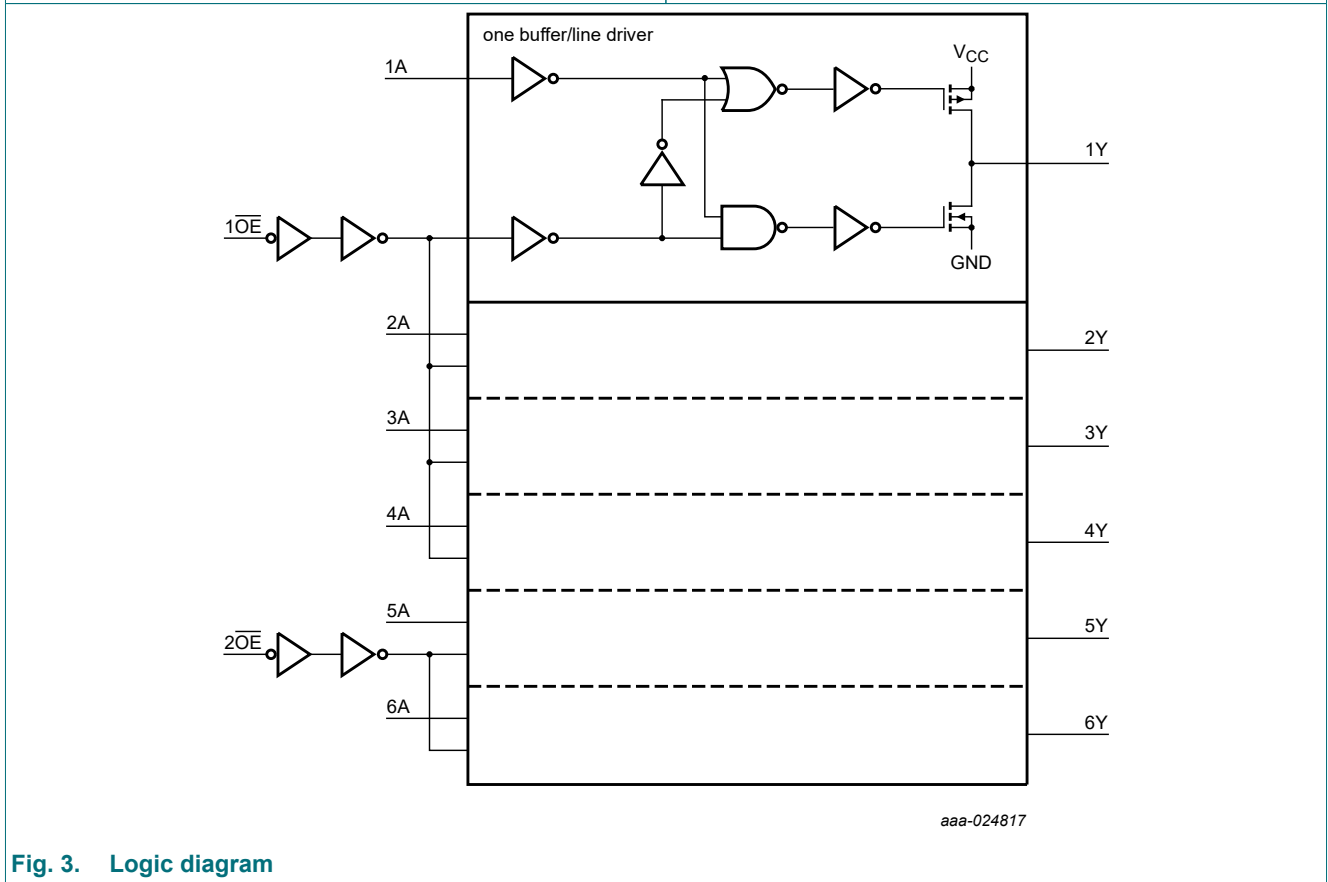
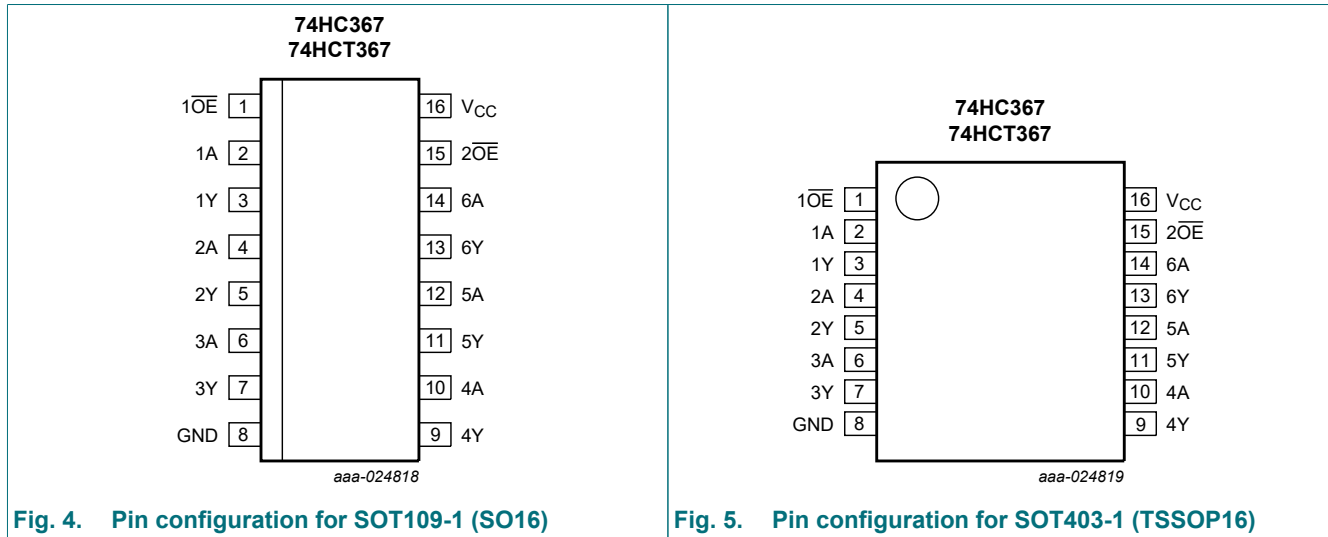


Fig. 3. Logic diagram

## 5. Pinning information

### 5.1. Pinning



### 5.2. Pin description

Table 2. Pin description

| Symbol                 | Pin                 | Description                      |
|------------------------|---------------------|----------------------------------|
| 1OE, 2OE               | 1, 15               | output enable input (active LOW) |
| 1A, 2A, 3A, 4A, 5A, 6A | 2, 4, 6, 10, 12, 14 | data input                       |
| 1Y, 2Y, 3Y, 4Y, 5Y, 6Y | 3, 5, 7, 9, 11, 13  | bus output                       |
| GND                    | 8                   | ground (0 V)                     |
| V <sub>CC</sub>        | 16                  | supply voltage                   |

## 6. Functional description

Table 3. Function table

H = HIGH voltage level; L = LOW voltage level; X = don't care; Z = high-impedance OFF-state.

| Input |    | Output |
|-------|----|--------|
| nOE   | nA | nY     |
| L     | L  | L      |
| L     | H  | H      |
| H     | X  | Z      |

## 7. Limiting values

**Table 4. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

| Symbol    | Parameter               | Conditions   | Min  | Max      | Unit |
|-----------|-------------------------|--|------|----------|------|
| $V_{CC}$  | supply voltage          |  | -0.5 | +7       | V    |
| $I_{IK}$  | input clamping current  | $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$ | -    | $\pm 20$ | mA   |
| $I_{OK}$  | output clamping current | $V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$ | -    | $\pm 20$ | mA   |
| $I_O$     | output current          | $-0.5\text{ V} < V_O < V_{CC} + 0.5\text{ V}$          | -    | $\pm 35$ | mA   |
| $I_{CC}$  | supply current          |  | -    | 70       | mA   |
| $I_{GND}$ | ground current          |  | -70  | -        | mA   |
| $T_{stg}$ | storage temperature     |  | -65  | +150     | °C   |
| $P_{tot}$ | total power dissipation | [1]  | -    | 500      | mW   |

- [1] For SOT109-1 (SO16) package:  $P_{tot}$  derates linearly with 12.4 mW/K above 110 °C.  
For SOT403-1 (TSSOP16) package:  $P_{tot}$  derates linearly with 8.5 mW/K above 91 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

Voltages are referenced to GND (ground = 0 V)

| Symbol              | Parameter                           | Conditions              | 74HC367 |      |          | 74HCT367 |      |          | Unit |
|---------------------|-------------------------------------|-------------------------|---------|------|----------|----------|------|----------|------|
|                     |                                     |                         | Min     | Typ  | Max      | Min      | Typ  | Max      |      |
| $V_{CC}$            | supply voltage                      |                         | 2.0     | 5.0  | 6.0      | 4.5      | 5.0  | 5.5      | V    |
| $V_I$               | input voltage                       |                         | 0       | -    | $V_{CC}$ | 0        | -    | $V_{CC}$ | V    |
| $V_O$               | output voltage                      |                         | 0       | -    | $V_{CC}$ | 0        | -    | $V_{CC}$ | V    |
| $T_{amb}$           | ambient temperature                 |                         | -40     | +25  | +125     | -40      | +25  | +125     | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 2.0\text{ V}$ | -       | -    | 625      | -        | -    | -        | ns/V |
|                     |                                     | $V_{CC} = 4.5\text{ V}$ | -       | 1.67 | 139      | -        | 1.67 | 139      | ns/V |
|                     |                                     | $V_{CC} = 6.0\text{ V}$ | -       | -    | 83       | -        | -    | -        | ns/V |

## 9. Static characteristics

**Table 6. Static characteristics**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol  | Parameter                 | Conditions   | 25 °C |      |      | -40 °C to +85 °C |      | -40 °C to +125 °C |      | Unit |
|---|---------------------------|--|-------|------|------|------------------|------|-------------------|------|------|
|   |                           |  | Min   | Typ  | Max  | Min              | Max  | Min               | Max  |      |
| <b>74HC367</b>                                    |                           |  |       |      |      |                  |      |                   |      |      |
| V <sub>IH</sub>                                   | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V  | 1.5   | 1.2  | -    | 1.5              | -    | 1.5               | -    | V    |
|   |                           | V <sub>CC</sub> = 4.5 V  | 3.15  | 2.4  | -    | 3.15             | -    | 3.15              | -    | V    |
|   |                           | V <sub>CC</sub> = 6.0 V  | 4.2   | 3.2  | -    | 4.2              | -    | 4.2               | -    | V    |
| V <sub>IL</sub>                                   | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V  | -     | 0.8  | 0.5  | -                | 0.5  | -                 | 0.5  | V    |
|   |                           | V <sub>CC</sub> = 4.5 V  | -     | 2.1  | 1.35 | -                | 1.35 | -                 | 1.35 | V    |
|   |                           | V <sub>CC</sub> = 6.0 V  | -     | 2.8  | 1.8  | -                | 1.8  | -                 | 1.8  | V    |
| V <sub>OH</sub>                                   | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>  |       |      |      |                  |      |                   |      |      |
|   |                           | I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 2.0 V   | 1.9   | 2.0  | -    | 1.9              | -    | 1.9               | -    | V    |
|   |                           | I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 4.5 V   | 4.4   | 4.5  | -    | 4.4              | -    | 4.4               | -    | V    |
|   |                           | I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 6.0 V   | 5.9   | 6.0  | -    | 5.9              | -    | 5.9               | -    | V    |
|   |                           | I <sub>O</sub> = -6.0 mA; V <sub>CC</sub> = 4.5 V  | 3.98  | 4.32 | -    | 3.84             | -    | 3.7               | -    | V    |
| I <sub>O</sub> = -7.8 mA; V <sub>CC</sub> = 6.0 V | 5.48                      | 5.81   | -     | 5.34 | -    | 5.2              | -    | V                 |      |      |
| V <sub>OL</sub>                                   | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>  |       |      |      |                  |      |                   |      |      |
|   |                           | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 2.0 V  | -     | 0    | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|   |                           | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 4.5 V  | -     | 0    | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|   |                           | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 6.0 V  | -     | 0    | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|   |                           | I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V   | -     | 0.15 | 0.26 | -                | 0.33 | -                 | 0.4  | V    |
| I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V  | -                         | 0.16   | 0.26  | -    | 0.33 | -                | 0.4  | V                 |      |      |
| I <sub>I</sub>                                    | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V   | -     | -    | ±0.1 | -                | ±1.0 | -                 | ±1.0 | μA   |
| I <sub>OZ</sub>                                   | OFF-state output current  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 6.0 V; V <sub>O</sub> = V <sub>CC</sub> or GND | -     | -    | ±0.5 | -                | ±5.0 | -                 | ±10  | μA   |
| I <sub>CC</sub>                                   | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 6.0 V                                 | -     | -    | 8.0  | -                | 80   | -                 | 160  | μA   |
| C <sub>I</sub>                                    | input capacitance         |  | -     | 3.5  | -    | -                | -    | -                 | -    | pF   |

| Symbol           | Parameter                 | Conditions  | 25 °C |      |      | -40 °C to +85 °C |      | -40 °C to +125 °C |      | Unit |
|------------------|---------------------------|---|-------|------|------|------------------|------|-------------------|------|------|
|                  |                           |   | Min   | Typ  | Max  | Min              | Max  | Min               | Max  |      |
| <b>74HCT367</b>  |                           |   |       |      |      |                  |      |                   |      |      |
| V <sub>IH</sub>  | HIGH-level input voltage  | V <sub>CC</sub> = 4.5 V to 5.5 V  | 2.0   | 1.6  | -    | 2.0              | -    | 2.0               | -    | V    |
| V <sub>IL</sub>  | LOW-level input voltage   | V <sub>CC</sub> = 4.5 V to 5.5 V  | -     | 1.2  | 0.8  | -                | 0.8  | -                 | 0.8  | V    |
| V <sub>OH</sub>  | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V   |       |      |      |                  |      |                   |      |      |
|                  |                           | I <sub>O</sub> = -20 µA   | 4.4   | 4.5  | -    | 4.4              | -    | 4.4               | -    | V    |
|                  |                           | I <sub>O</sub> = -6 mA  | 3.98  | 4.32 | -    | 3.84             | -    | 3.7               | -    | V    |
| V <sub>OL</sub>  | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V   |       |      |      |                  |      |                   |      |      |
|                  |                           | I <sub>O</sub> = 20 µA  | -     | 0    | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                  |                           | I <sub>O</sub> = 6.0 mA   | -     | 0.16 | 0.26 | -                | 0.33 | -                 | 0.4  | V    |
| I <sub>I</sub>   | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V  | -     | -    | ±0.1 | -                | ±1.0 | -                 | ±1.0 | µA   |
| I <sub>OZ</sub>  | OFF-state output current  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 5.5 V;<br>V <sub>O</sub> = V <sub>CC</sub> or GND                                     | -     | -    | ±0.5 | -                | ±5.0 | -                 | ±10  | µA   |
| I <sub>CC</sub>  | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V;<br>I <sub>O</sub> = 0 A   | -     | -    | 8.0  | -                | 80   | -                 | 160  | µA   |
| ΔI <sub>CC</sub> | additional supply current | per input pin; V <sub>I</sub> = V <sub>CC</sub> - 2.1 V;<br>other inputs at V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 4.5 V to 5.5 V; I <sub>O</sub> = 0 A |       |      |      |                  |      |                   |      |      |
|                  |                           | 1 $\overline{\text{OE}}$ , nA inputs  | -     | 100  | 360  | -                | 450  | -                 | 490  | µA   |
|                  |                           | 2 $\overline{\text{OE}}$ input  | -     | 90   | 324  | -                | 405  | -                 | 441  | µA   |
| C <sub>I</sub>   | input capacitance         |   | -     | 3.5  | -    | -                | -    | -                 | -    | pF   |

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; for test circuit, see Fig. 8.

| Symbol          | Parameter                     | Conditions  | 25 °C |     |     | -40 °C to +85 °C |     | -40 °C to +125 °C |     | Unit |
|-----------------|-------------------------------|---|-------|-----|-----|------------------|-----|-------------------|-----|------|
|                 |                               |   | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| <b>74HC367</b>  |                               |   |       |     |     |                  |     |                   |     |      |
| $t_{pd}$        | propagation delay             | nA to nY; see Fig. 6 [1]                              |       |     |     |                  |     |                   |     |      |
|                 |                               | $V_{CC} = 2.0$ V                                      | -     | 28  | 95  | -                | 120 | -                 | 145 | ns   |
|                 |                               | $V_{CC} = 4.5$ V                                      | -     | 10  | 19  | -                | 24  | -                 | 29  | ns   |
|                 |                               | $V_{CC} = 5.0$ V; $C_L = 15$ pF                       | -     | 8   | -   | -                | -   | -                 | -   | ns   |
|                 |                               | $V_{CC} = 6.0$ V                                      | -     | 8   | 16  | -                | 20  | -                 | 25  | ns   |
| $t_{en}$        | enable time                   | nOE to nY; see Fig. 7 [1]                             |       |     |     |                  |     |                   |     |      |
|                 |                               | $V_{CC} = 2.0$ V                                      | -     | 44  | 150 | -                | 190 | -                 | 225 | ns   |
|                 |                               | $V_{CC} = 4.5$ V                                      | -     | 16  | 30  | -                | 38  | -                 | 45  | ns   |
|                 |                               | $V_{CC} = 6.0$ V                                      | -     | 13  | 26  | -                | 33  | -                 | 38  | ns   |
| $t_{dis}$       | disable time                  | nOE to nY; see Fig. 7 [1]                             |       |     |     |                  |     |                   |     |      |
|                 |                               | $V_{CC} = 2.0$ V                                      | -     | 55  | 150 | -                | 190 | -                 | 225 | ns   |
|                 |                               | $V_{CC} = 4.5$ V                                      | -     | 20  | 30  | -                | 38  | -                 | 45  | ns   |
|                 |                               | $V_{CC} = 6.0$ V                                      | -     | 16  | 26  | -                | 33  | -                 | 38  | ns   |
| $t_t$           | transition time               | see Fig. 6 [1]  |       |     |     |                  |     |                   |     |      |
|                 |                               | $V_{CC} = 2.0$ V                                      | -     | 14  | 60  | -                | 75  | -                 | 90  | ns   |
|                 |                               | $V_{CC} = 4.5$ V                                      | -     | 5   | 12  | -                | 15  | -                 | 18  | ns   |
|                 |                               | $V_{CC} = 6.0$ V                                      | -     | 4   | 10  | -                | 13  | -                 | 15  | ns   |
| $C_{PD}$        | power dissipation capacitance | per buffer; $V_I = \text{GND to } V_{CC}$ [2]         | -     | 30  | -   | -                | -   | -                 | -   | pF   |
| <b>74HCT367</b> |                               |   |       |     |     |                  |     |                   |     |      |
| $t_{pd}$        | propagation delay             | nA to nY; see Fig. 6 [1]                              |       |     |     |                  |     |                   |     |      |
|                 |                               | $V_{CC} = 4.5$ V                                      | -     | 14  | 25  | -                | 31  | -                 | 38  | ns   |
|                 |                               | $V_{CC} = 5.0$ V; $C_L = 15$ pF                       | -     | 11  | -   | -                | -   | -                 | -   | ns   |
| $t_{en}$        | enable time                   | nOE to nY; $V_{CC} = 4.5$ V; see Fig. 7 [1]           | -     | 16  | 35  | -                | 44  | -                 | 53  | ns   |
| $t_{dis}$       | disable time                  | nOE to nY; $V_{CC} = 4.5$ V; see Fig. 7 [1]           | -     | 21  | 35  | -                | 44  | -                 | 53  | ns   |
| $t_t$           | transition time               | $V_{CC} = 4.5$ V; see Fig. 6 [1]                      | -     | 5   | 12  | -                | 15  | -                 | 18  | ns   |
| $C_{PD}$        | power dissipation capacitance | per buffer; $V_I = \text{GND to } V_{CC} - 1.5$ V [2] | -     | 32  | -   | -                | -   | -                 | -   | pF   |

[1]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ ;  $t_{en}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ ;  $t_{dis}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ ;  $t_t$  is the same as  $t_{THL}$  and  $t_{TLH}$ .

[2]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ):

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

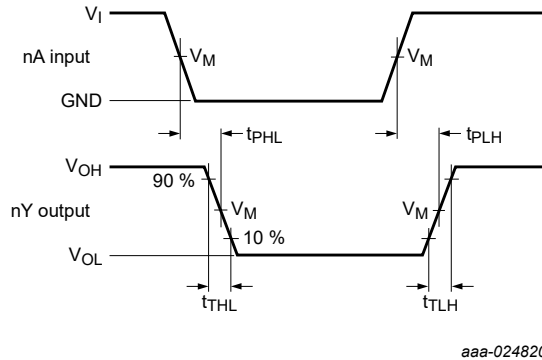
$C_L$  = output load capacitance in pF;

$V_{CC}$  = supply voltage in V;

$N$  = number of inputs switching;

$\Sigma(C_L \times V_{CC}^2 \times f_o)$  = sum of outputs.

10.1. Waveforms and test circuit

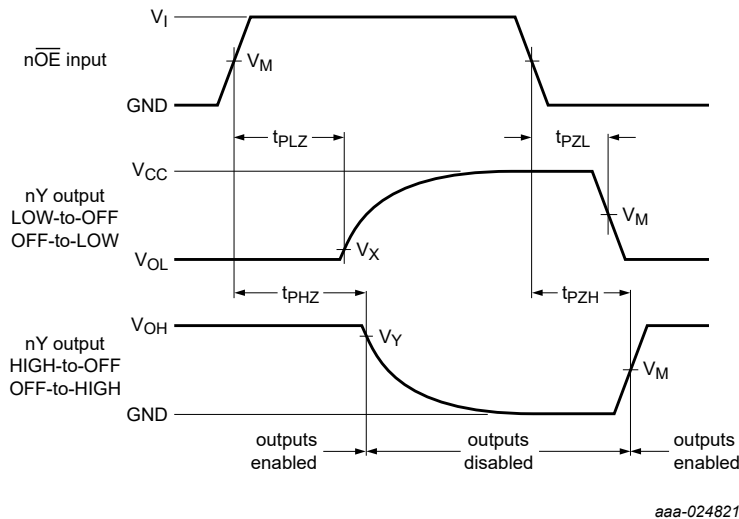


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Measurement points are given in [Table 8](#).

$V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

Fig. 6. Input (nA) to output (nY) propagation delays and output transition times



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Measurement points are given in [Table 8](#).

$V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

Fig. 7. 3-state enable and disable times

Table 8. Measurement points

| Type     | Input               | Output              |                     |                     |
|----------|---------------------|---------------------|---------------------|---------------------|
|          | $V_M$               | $V_M$               | $V_X$               | $V_Y$               |
| 74HC367  | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $0.1 \times V_{CC}$ | $0.9 \times V_{CC}$ |
| 74HCT367 | 1.3 V               | 1.3 V               | $0.1 \times V_{CC}$ | $0.9 \times V_{CC}$ |



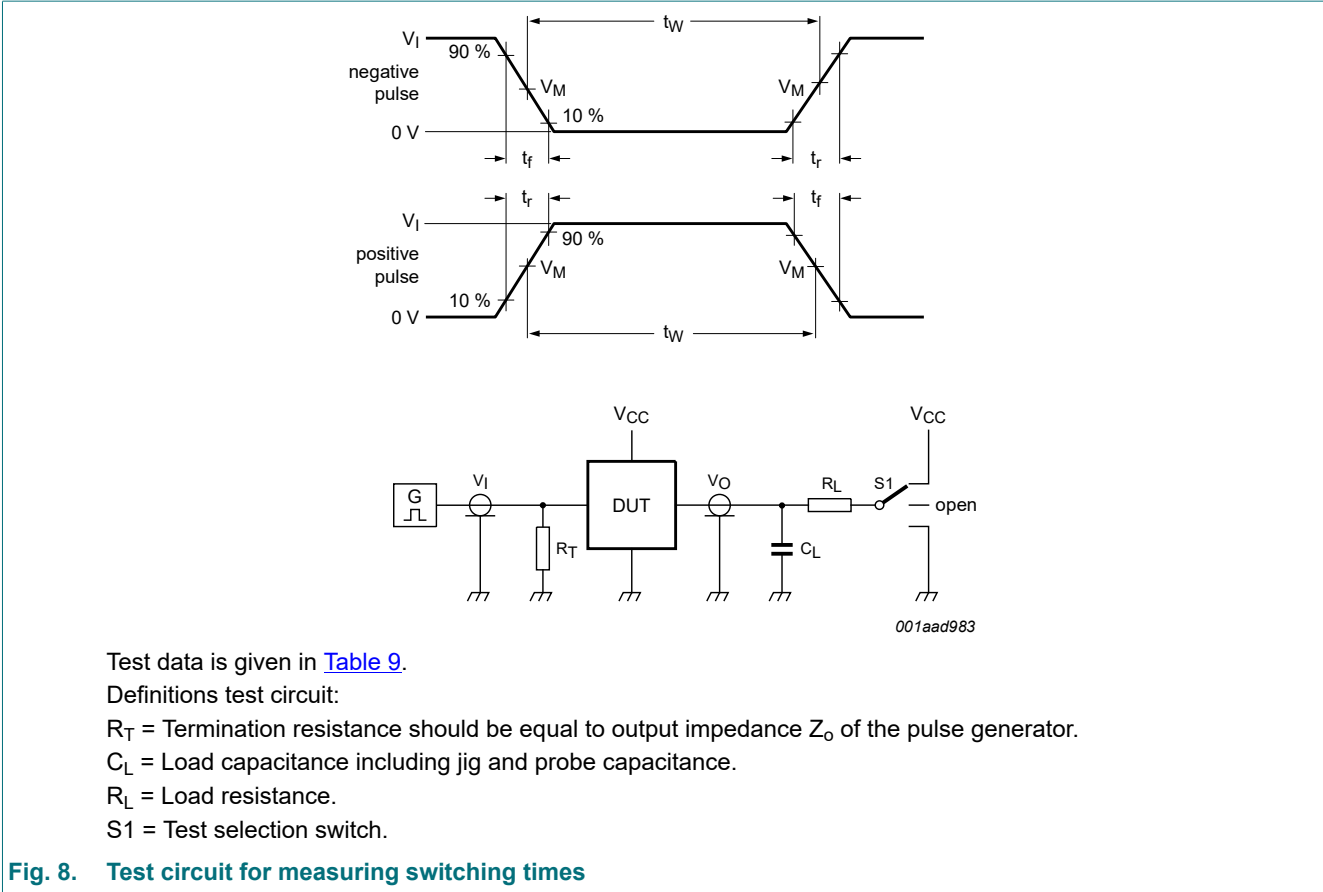


Fig. 8. Test circuit for measuring switching times

Table 9. Test data

| Type     | Input    |            | Load         |              | S1 position        |                    |                    |
|----------|----------|------------|--------------|--------------|--------------------|--------------------|--------------------|
|          | $V_I$    | $t_r, t_f$ | $C_L$        | $R_L$        | $t_{PHL}, t_{PLH}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ |
| 74HC367  | $V_{CC}$ | 6 ns       | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |
| 74HCT367 | 3 V      | 6 ns       | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |

11. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mm

SOT109-1



Fig. 9. Package outline SOT109-1 (SO16)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm

SOT403-1



Fig. 10. Package outline SOT403-1 (TSSOP16)

## 12. Abbreviations

Table 10. Abbreviations

| Acronym | Description                             |
|---------|---|
| CMOS    | Complementary Metal Oxide Semiconductor |
| DUT     | Device Under Test                       |
| ESD     | ElectroStatic Discharge                 |
| HBM     | Human Body Model                        |
| MM      | Machine Model                           |
| TTL     | Transistor-Transistor Logic             |

## 13. Revision history

Table 11. Revision history

| Document ID         | Release date  | Data sheet status     | Change notice | Supersedes          |
|---------------------|---|-----------------------|---------------|---------------------|
| 74HC_HCT367 v.4     | 20210224  | Product data sheet    | -             | 74HC_HCT367 v.3     |
| Modifications:      | <ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li><a href="#">Section 2</a> updated.</li> <li><a href="#">Section 7</a>: Derating values for <math>P_{tot}</math> total power dissipation updated.</li> <li>Type numbers 74HC367DB and 74HCT367DB (SOT338-1 / SSOP16) removed.</li> </ul> |                       |               |                     |
| 74HC_HCT367 v.3     | 20161017  | Product data sheet    | -             | 74HC_HCT367_CNV v.2 |
| Modifications:      | <ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Type numbers 74HC367N and 74HCT367N removed.</li> </ul>   |                       |               |                     |
| 74HC_HCT367_CNV v.2 | 19901201  | Product specification | -             | -                   |

## 14. Legal information

### Data sheet status

| Document status [1][2]         | Product status [3] | Definition  |
|--------------------------------|--------------------|---|
| Objective [short] data sheet   | Development        | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification      | This document contains data from the preliminary specification.                       |
| Product [short] data sheet     | Production         | This document contains the product specification.                                     |

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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## Contents

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|  |           |
|--|-----------|
| <b>1. General description</b> .....              | <b>1</b>  |
| <b>2. Features and benefits</b> .....            | <b>1</b>  |
| <b>3. Ordering information</b> .....             | <b>1</b>  |
| <b>4. Functional diagram</b> .....               | <b>2</b>  |
| <b>5. Pinning information</b> .....              | <b>3</b>  |
| 5.1. Pinning.....                                | 3         |
| 5.2. Pin description.....                        | 3         |
| <b>6. Functional description</b> .....           | <b>3</b>  |
| <b>7. Limiting values</b> .....                  | <b>4</b>  |
| <b>8. Recommended operating conditions</b> ..... | <b>4</b>  |
| <b>9. Static characteristics</b> .....           | <b>5</b>  |
| <b>10. Dynamic characteristics</b> .....         | <b>7</b>  |
| 10.1. Waveforms and test circuit.....            | 8         |
| <b>11. Package outline</b> .....                 | <b>10</b> |
| <b>12. Abbreviations</b> .....                   | <b>12</b> |
| <b>13. Revision history</b> .....                | <b>12</b> |
| <b>14. Legal information</b> .....               | <b>13</b> |

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