

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 | | | Version |
|-------------|-------------------|---------|--|----------|
| | Temperature range | Name | Description | |
| 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

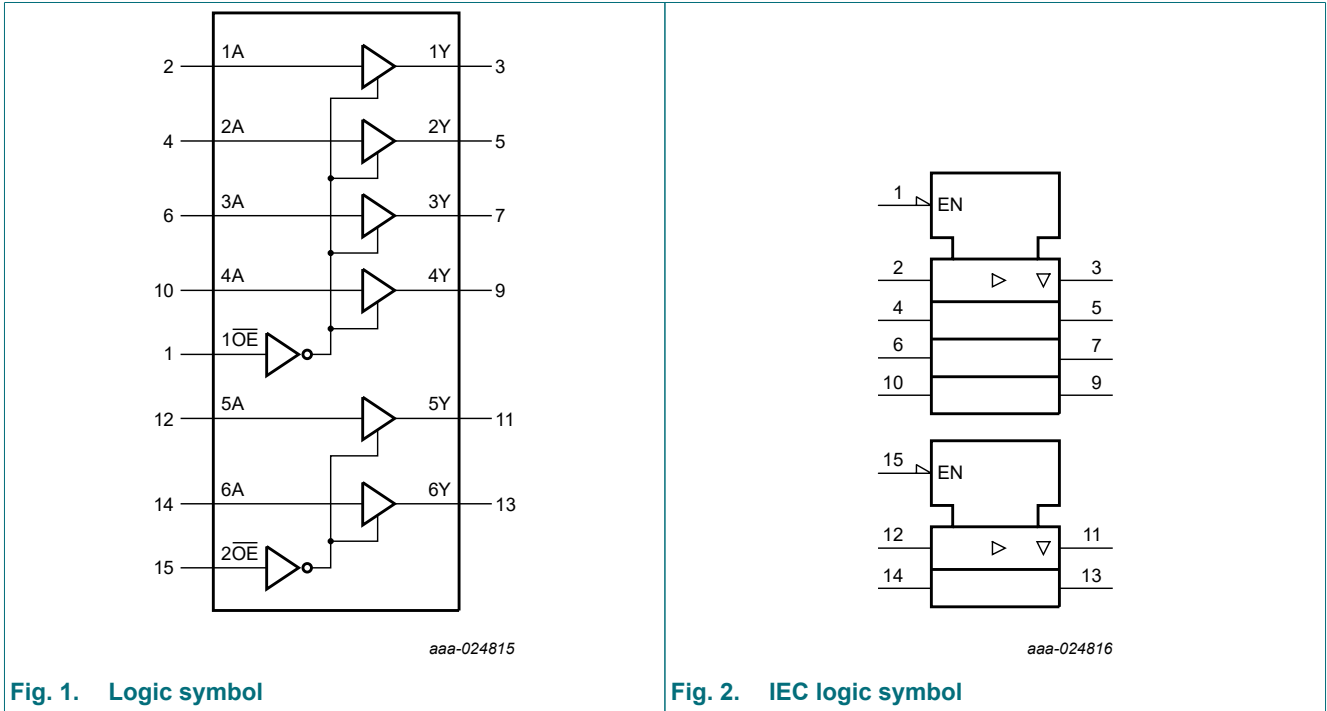


Fig. 1. Logic symbol

Fig. 2. IEC logic symbol

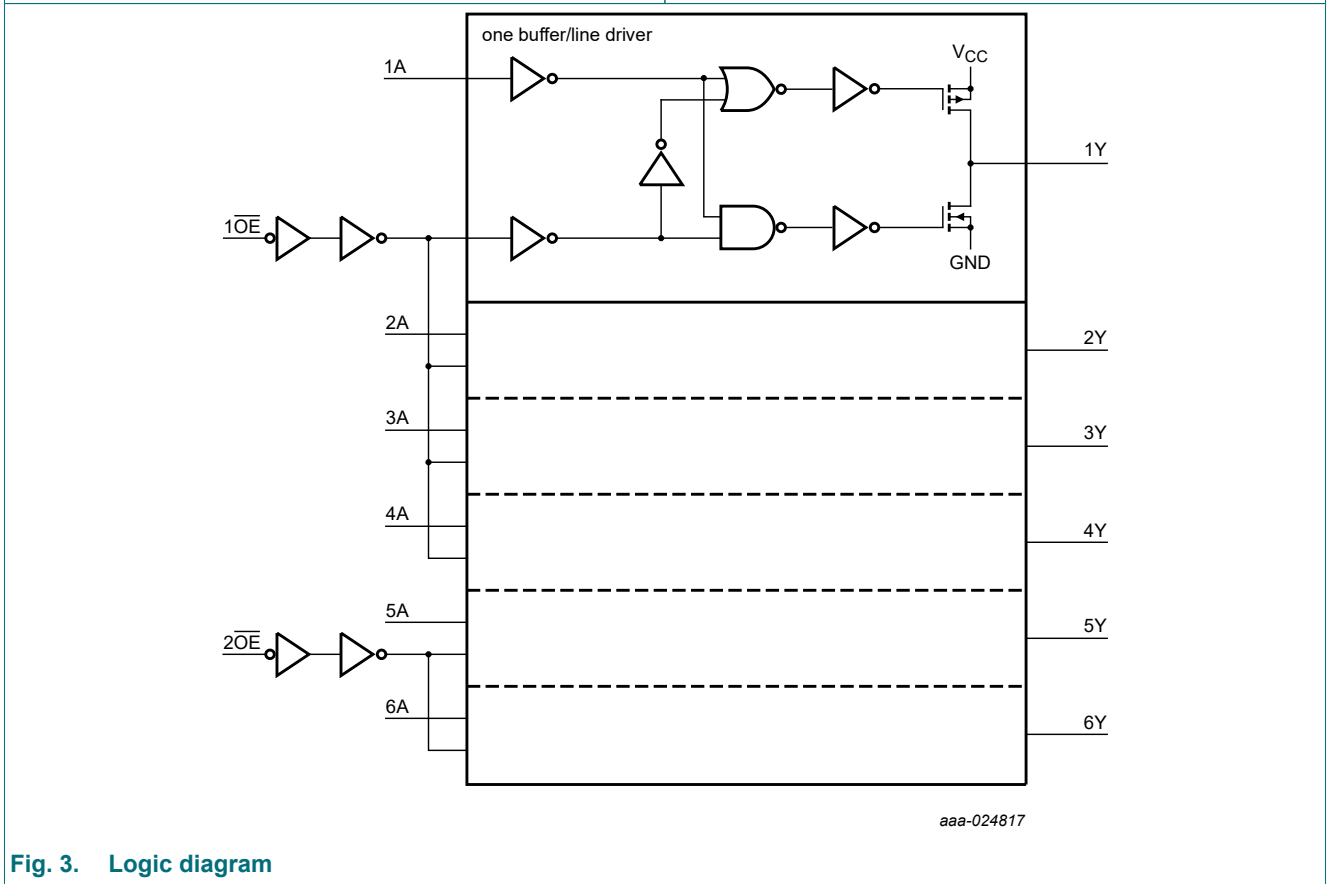
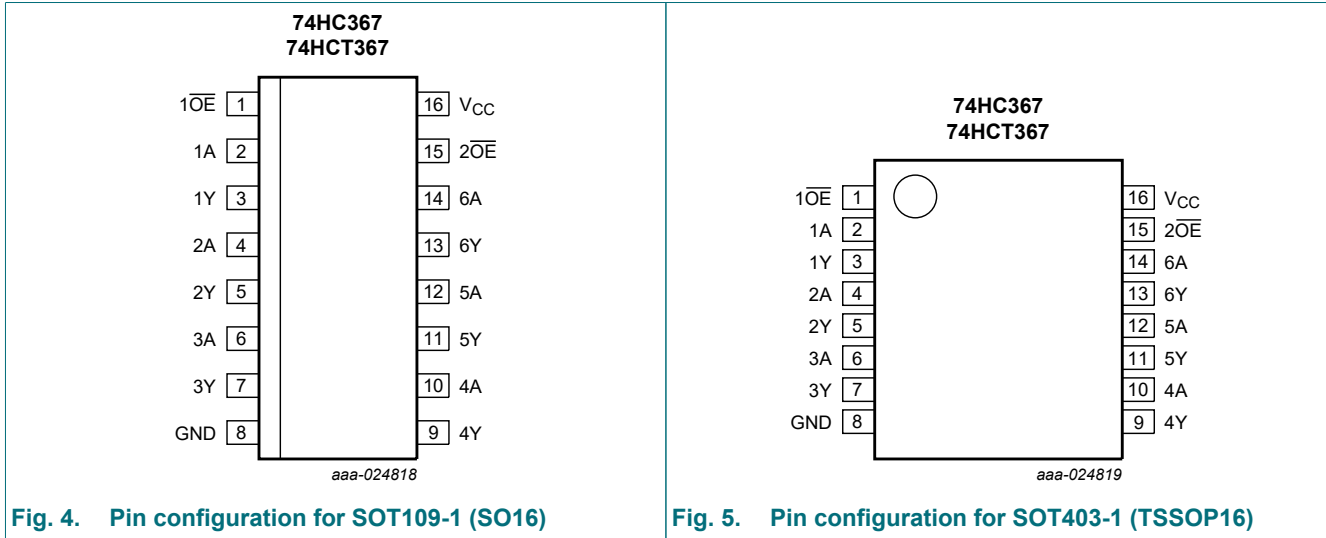


Fig. 3. Logic diagram

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 _{CC} | 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 $V_I > V_{CC} + 0.5\text{ V}$ | - | ± 20 | mA |
| I_{OK} | output clamping current | $V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$ | - | ± 20 | mA |
| I_O | output current | $-0.5\text{ V} < V_O < V_{CC} + 0.5\text{ V}$ | - | ± 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 | |
| 74HC367 | | | | | | | | | | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 2.0 V | 1.5 | 1.2 | - | 1.5 | - | 1.5 | - | V |
| | | V _{CC} = 4.5 V | 3.15 | 2.4 | - | 3.15 | - | 3.15 | - | V |
| | | V _{CC} = 6.0 V | 4.2 | 3.2 | - | 4.2 | - | 4.2 | - | V |
| V _{IL} | LOW-level input voltage | V _{CC} = 2.0 V | - | 0.8 | 0.5 | - | 0.5 | - | 0.5 | V |
| | | V _{CC} = 4.5 V | - | 2.1 | 1.35 | - | 1.35 | - | 1.35 | V |
| | | V _{CC} = 6.0 V | - | 2.8 | 1.8 | - | 1.8 | - | 1.8 | V |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} | | | | | | | | |
| | | I _O = -20 μA; V _{CC} = 2.0 V | 1.9 | 2.0 | - | 1.9 | - | 1.9 | - | V |
| | | I _O = -20 μA; V _{CC} = 4.5 V | 4.4 | 4.5 | - | 4.4 | - | 4.4 | - | V |
| | | I _O = -20 μA; V _{CC} = 6.0 V | 5.9 | 6.0 | - | 5.9 | - | 5.9 | - | V |
| | | I _O = -6.0 mA; V _{CC} = 4.5 V | 3.98 | 4.32 | - | 3.84 | - | 3.7 | - | V |
| I _O = -7.8 mA; V _{CC} = 6.0 V | 5.48 | 5.81 | - | 5.34 | - | 5.2 | - | V | | |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} | | | | | | | | |
| | | I _O = 20 μA; V _{CC} = 2.0 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 20 μA; V _{CC} = 4.5 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 20 μA; V _{CC} = 6.0 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 6.0 mA; V _{CC} = 4.5 V | - | 0.15 | 0.26 | - | 0.33 | - | 0.4 | V |
| I _O = 7.8 mA; V _{CC} = 6.0 V | - | 0.16 | 0.26 | - | 0.33 | - | 0.4 | V | | |
| I _I | input leakage current | V _I = V _{CC} or GND; V _{CC} = 6.0 V | - | - | ±0.1 | - | ±1.0 | - | ±1.0 | μA |
| I _{OZ} | OFF-state output current | V _I = V _{IH} or V _{IL} ; V _{CC} = 6.0 V; V _O = V _{CC} or GND | - | - | ±0.5 | - | ±5.0 | - | ±10 | μA |
| I _{CC} | supply current | V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 6.0 V | - | - | 8.0 | - | 80 | - | 160 | μA |
| C _I | 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 | |
| 74HCT367 | | | | | | | | | | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 4.5 V to 5.5 V | 2.0 | 1.6 | - | 2.0 | - | 2.0 | - | V |
| V _{IL} | LOW-level input voltage | V _{CC} = 4.5 V to 5.5 V | - | 1.2 | 0.8 | - | 0.8 | - | 0.8 | V |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} ; V _{CC} = 4.5 V | | | | | | | | |
| | | I _O = -20 µA | 4.4 | 4.5 | - | 4.4 | - | 4.4 | - | V |
| | | I _O = -6 mA | 3.98 | 4.32 | - | 3.84 | - | 3.7 | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} ; V _{CC} = 4.5 V | | | | | | | | |
| | | I _O = 20 µA | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 6.0 mA | - | 0.16 | 0.26 | - | 0.33 | - | 0.4 | V |
| I _I | input leakage current | V _I = V _{CC} or GND; V _{CC} = 5.5 V | - | - | ±0.1 | - | ±1.0 | - | ±1.0 | µA |
| I _{OZ} | OFF-state output current | V _I = V _{IH} or V _{IL} ; V _{CC} = 5.5 V; V _O = V _{CC} or GND | - | - | ±0.5 | - | ±5.0 | - | ±10 | µA |
| I _{CC} | supply current | V _I = V _{CC} or GND; V _{CC} = 5.5 V; I _O = 0 A | - | - | 8.0 | - | 80 | - | 160 | µA |
| ΔI _{CC} | additional supply current | per input pin; V _I = V _{CC} - 2.1 V; other inputs at V _{CC} or GND; V _{CC} = 4.5 V to 5.5 V; I _O = 0 A | | | | | | | | |
| | | 1 $\overline{\text{OE}}$, nA inputs | - | 100 | 360 | - | 450 | - | 490 | µA |
| | | 2 $\overline{\text{OE}}$ input | - | 90 | 324 | - | 405 | - | 441 | µA |
| C _I | 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 | |
| 74HC367 | | | | | | | | | | |
| 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 |
| 74HCT367 | | | | | | | | | | |
| 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 μW):

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

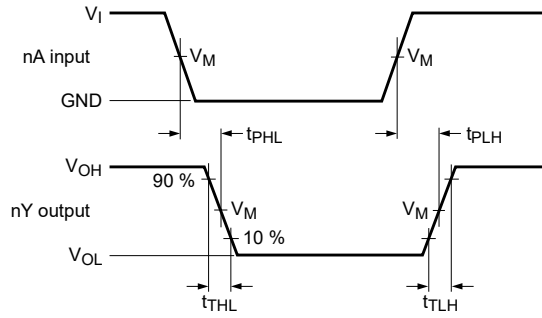
C_L = output load capacitance in pF;

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

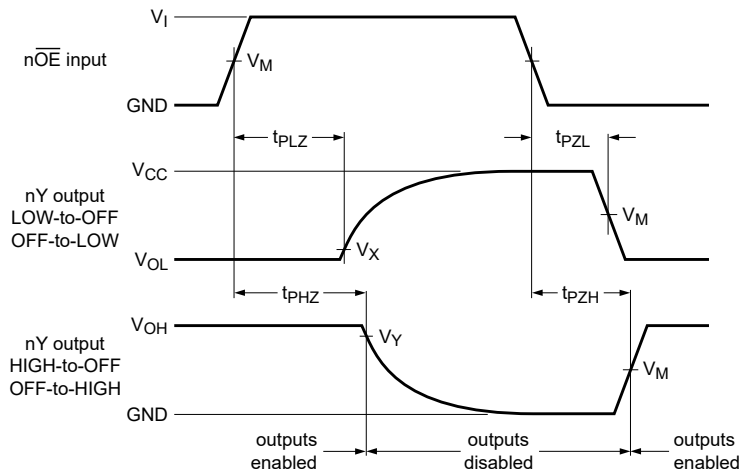


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Measurement points are given in [Table 8](#).

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 | $0.1 \times V_{CC}$ | $0.9 \times V_{CC}$ |

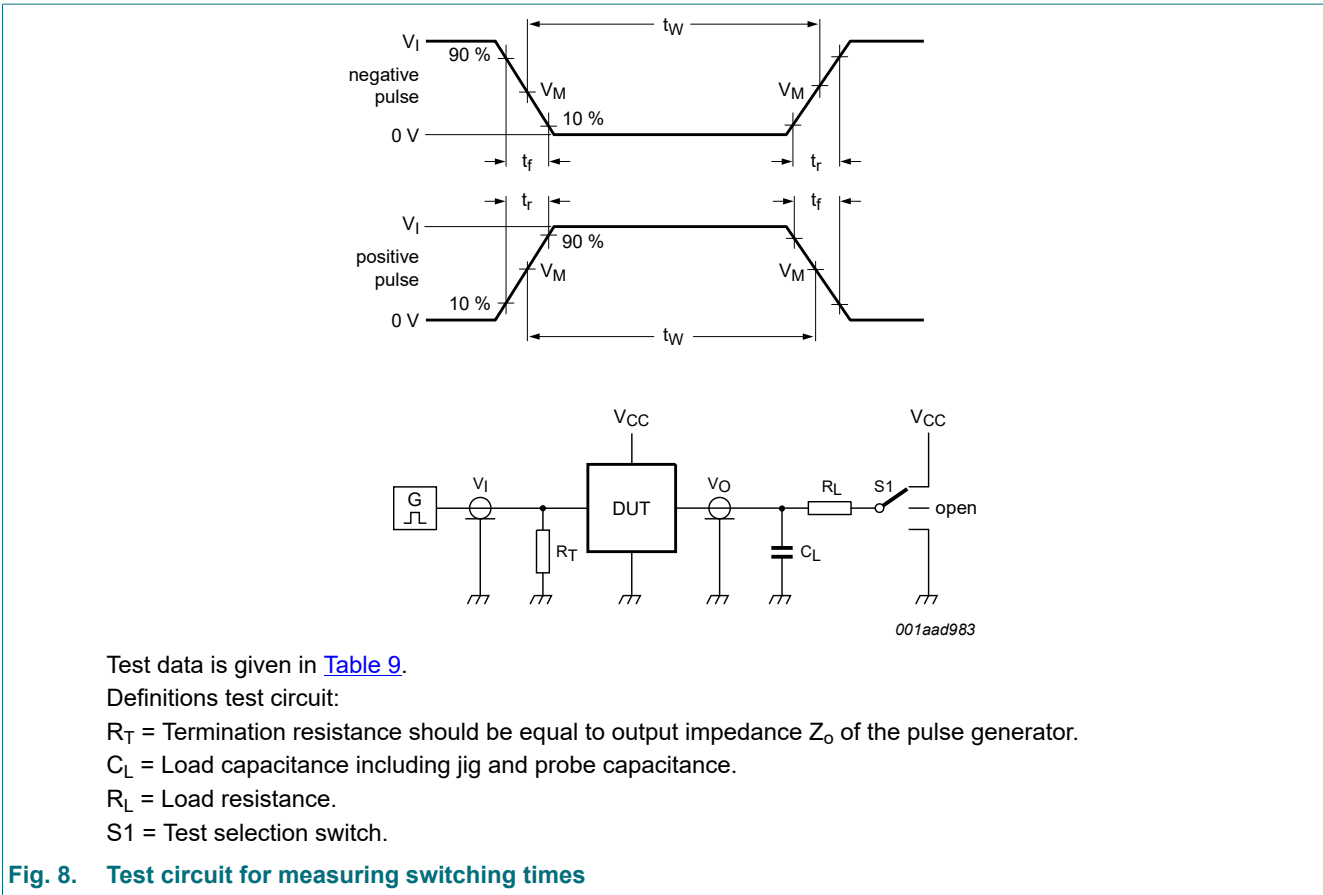


Fig. 8. Test circuit for measuring switching times

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 Ω | open | GND | V_{CC} |
| 74HCT367 | 3 V | 6 ns | 15 pF, 50 pF | 1 k Ω | open | GND | V_{CC} |

11. Package outline

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

SOT109-1

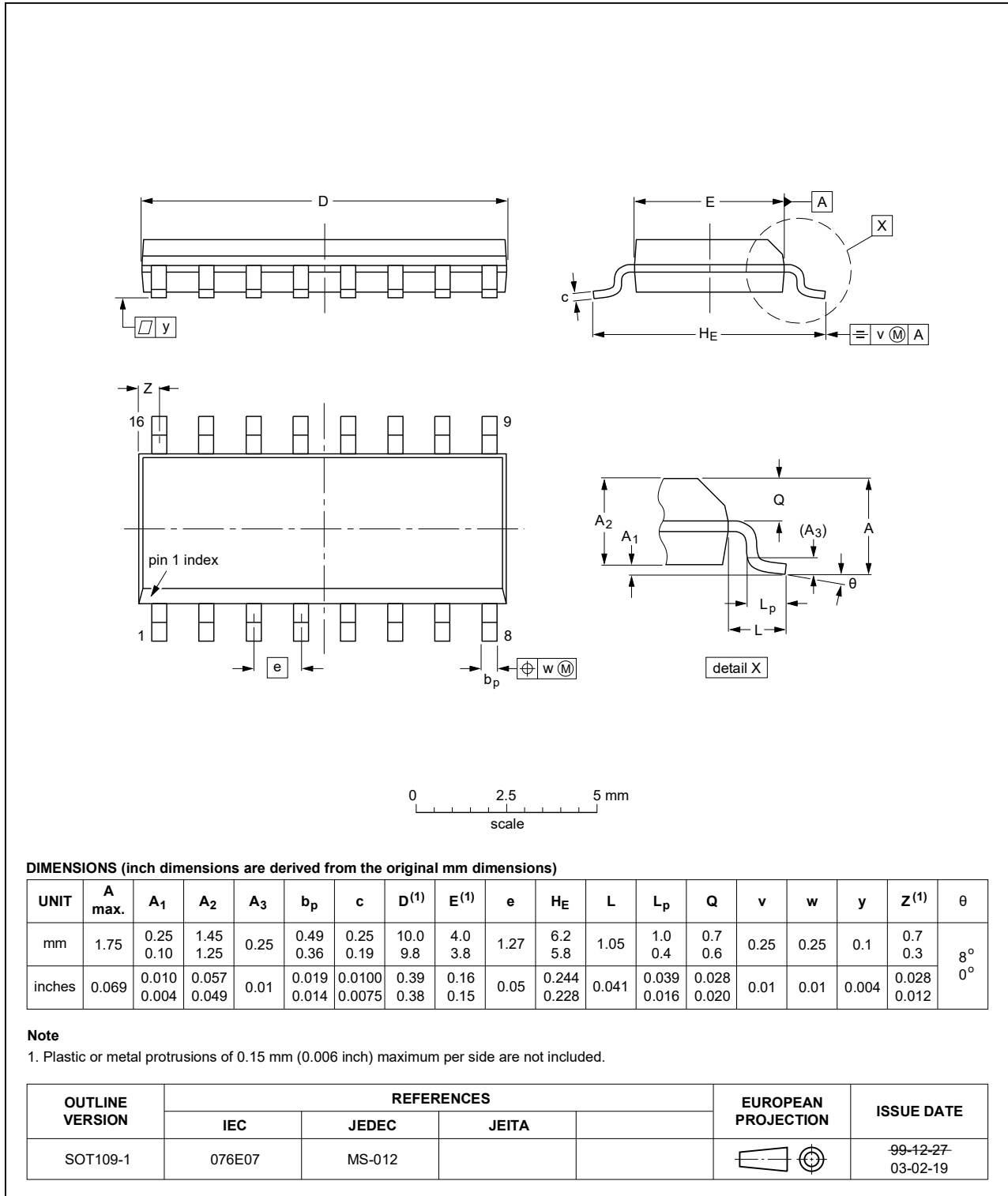


Fig. 9. Package outline SOT109-1 (SO16)

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

SOT403-1

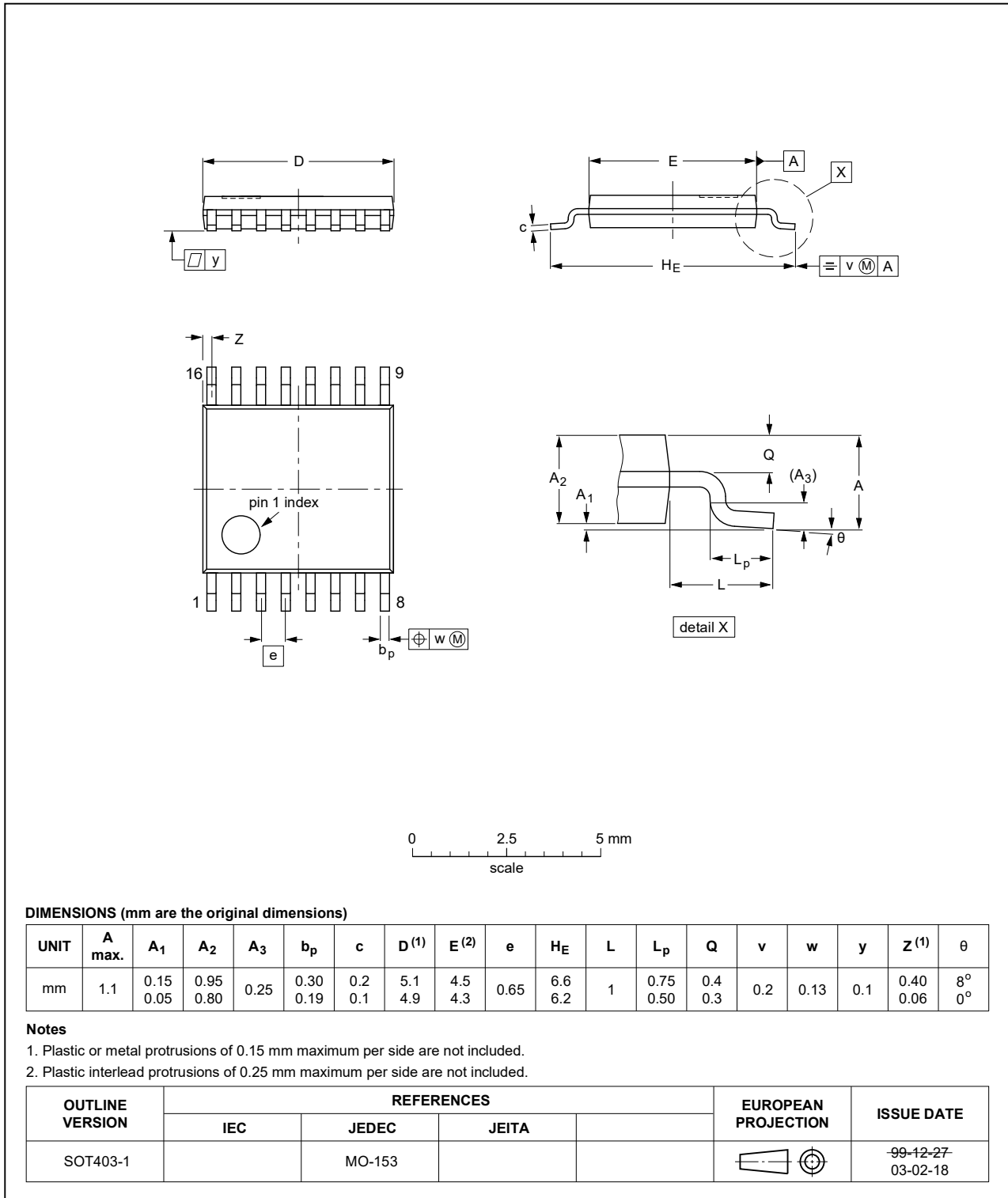


Fig. 10. Package outline SOT403-1 (TSSOP16)

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

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- [2] The term 'short data sheet' is explained in section "Definitions".
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Contents

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

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