

# 74HC366; 74HCT366

Hex buffer/line driver; 3-state; inverting

Rev. 4 — 4 September 2012

Product data sheet

## 1. General description

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The 74HC366; 74HCT366 is a hex inverter/line driver with 3-state outputs controlled by the output enable inputs ( $\overline{OE1}$ ). A HIGH on  $\overline{OE1}$  causes the outputs to assume a high impedance OFF-state. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ .

The 74HC366; 74HCT366 is functionally identical to:

- 74HC365; 74HCT365, but has inverted outputs

## 2. Features and benefits

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- Inverting outputs
- Input levels:
  - ◆ For 74HC366: CMOS level
  - ◆ For 74HCT366: TTL level
- Complies with JEDEC standard no. 7A
- ESD protection:
  - ◆ HBM EIA/JESD22-A114-F exceeds 2000 V
  - ◆ MM EIA/JESD22-A115-A exceeds 200 V
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$
- Multiple package options



3. Ordering information

Table 1. Ordering information

| Type number     | Package           |         |                                                                        |          |
|-----------------|-------------------|---------|------------------------------------------------------------------------|----------|
|                 | Temperature range | Name    | Description                                                            | Version  |
| <b>74HC366</b>  |                   |         |                                                                        |          |
| 74HC366D        | −40 °C to +125 °C | SO16    | plastic small outline package; 16 leads; body width 3.9 mm             | SOT109-1 |
| 74HC366N        | −40 °C to +125 °C | DIP16   | plastic dual in-line package; 16 leads (300 mil); long body            | SOT38-1  |
| 74HC366PW       | −40 °C to +125 °C | TSSOP16 | plastic thin shrink small outline package; 16 leads; body width 4.4 mm | SOT403-1 |
| <b>74HCT366</b> |                   |         |                                                                        |          |
| 74HCT366D       | −40 °C to +125 °C | SO16    | plastic small outline package; 16 leads; body width 3.9 mm             | SOT109-1 |
| 74HCT366DB      | −40 °C to +125 °C | SSOP16  | plastic shrink small outline package; 16 leads; body width 5.3 mm      | SOT338-1 |
| 74HCT366N       | −40 °C to +125 °C | DIP16   | plastic dual in-line package; 16 leads (300 mil); long body            | SOT38-1  |
| 74HCT366PW      | −40 °C to +125 °C | TSSOP16 | plastic thin shrink small outline package; 16 leads; body width 4.4 mm | SOT403-1 |

4. Functional diagram

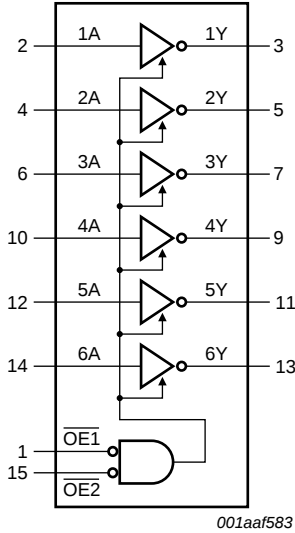


Fig 1. Functional diagram

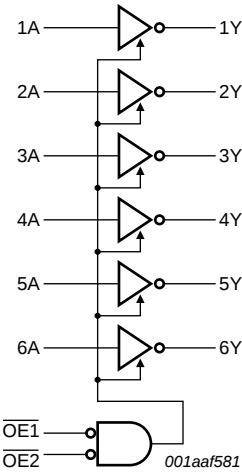


Fig 2. Logic symbol

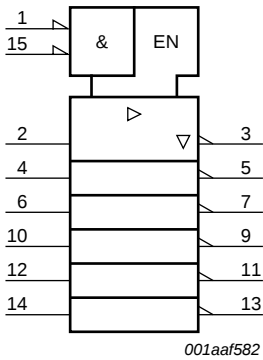


Fig 3. IEC logic symbol

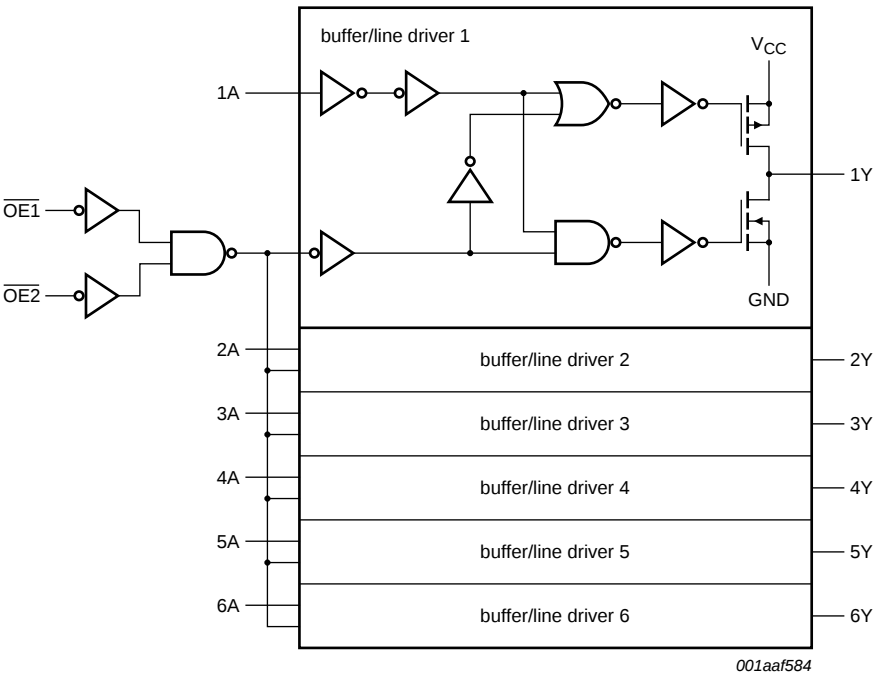


Fig 4. Logic diagram

5. Pinning information

5.1 Pinning

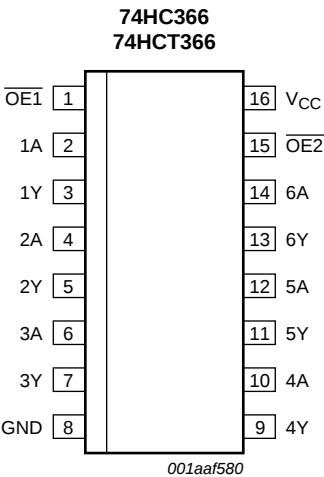


Fig 5. Pin configuration

## 5.2 Pin description

Table 2. Pin description

| Symbol                  | Pin | Description                        |
|-------------------------|-----|------------------------------------|
| $\overline{\text{OE1}}$ | 1   | output enable input 1 (active LOW) |
| 1A                      | 2   | data input 1                       |
| 1Y                      | 3   | data output 1                      |
| 2A                      | 4   | data input 2                       |
| 2Y                      | 5   | data output 2                      |
| 3A                      | 6   | data input 3                       |
| 3Y                      | 7   | data output 3                      |
| GND                     | 8   | ground (0 V)                       |
| 4Y                      | 9   | data output 4                      |
| 4A                      | 10  | data input 4                       |
| 5Y                      | 11  | data output 5                      |
| 5A                      | 12  | data input 5                       |
| 6Y                      | 13  | data output 6                      |
| 6A                      | 14  | data input 6                       |
| $\overline{\text{OE2}}$ | 15  | output enable input 2 (active LOW) |
| V <sub>CC</sub>         | 16  | supply voltage                     |

## 6. Functional description

Table 3. Function table<sup>[1]</sup>

| Control                 |                         | Input | Output |
|-------------------------|-------------------------|-------|--------|
| $\overline{\text{OE1}}$ | $\overline{\text{OE2}}$ | nA    | nY     |
| L                       | L                       | L     | H      |
| L                       | L                       | H     | L      |
| X                       | H                       | X     | Z      |
| H                       | X                       | X     | Z      |

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

## 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          | $V_O = -0.5\text{ V}$ to $(V_{CC} + 0.5\text{ V})$     | -     | $\pm 35$ | 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 | DIP16 package                                          | [1] - | 750      | mW   |
|           |                         | SO16 package                                           | [2] - | 500      | mW   |
|           |                         | SSOP16 package                                         | [3] - | 500      | mW   |
|           |                         | TSSOP16 package                                        | [3] - | 500      | mW   |

[1] For DIP16 packages:  $P_{tot}$  derates linearly with 12 mW/K above 70 °C.

[2] For SO16 packages:  $P_{tot}$  derates linearly with 8 mW/K above 70 °C.

[3] For SSOP16 and TSSOP16 packages:  $P_{tot}$  derates linearly with 5.5 mW/K above 60 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

Voltages are referenced to GND (ground = 0 V)

| Symbol              | Parameter                           | Conditions              | 74HC366 |      |          | 74HCT366 |      |          | 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 74HC366**

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

| Symbol                                    | Parameter                 | Conditions                                                                                                             | Min  | Typ  | Max  | Unit |
|-------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| <b>T<sub>amb</sub> = 25 °C</b>            |                           |                                                                                                                        |      |      |      |      |
| V <sub>IH</sub>                           | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V                                                                                                | 1.5  | 1.2  | -    | V    |
|                                           |                           | V <sub>CC</sub> = 4.5 V                                                                                                | 3.15 | 2.4  | -    | V    |
|                                           |                           | V <sub>CC</sub> = 6.0 V                                                                                                | 4.2  | 3.2  | -    | V    |
| V <sub>IL</sub>                           | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V                                                                                                | -    | 0.8  | 0.5  | V    |
|                                           |                           | V <sub>CC</sub> = 4.5 V                                                                                                | -    | 2.1  | 1.35 | V    |
|                                           |                           | V <sub>CC</sub> = 6.0 V                                                                                                | -    | 2.8  | 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  | -    | V    |
|                                           |                           | I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 4.5 V                                                                       | 4.4  | 4.5  | -    | V    |
|                                           |                           | I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 6.0 V                                                                       | 5.9  | 6.0  | -    | V    |
|                                           |                           | I <sub>O</sub> = -6.0 mA; V <sub>CC</sub> = 4.5 V                                                                      | 3.98 | 4.32 | -    | V    |
|                                           |                           | I <sub>O</sub> = -7.8 mA; V <sub>CC</sub> = 6.0 V                                                                      | 5.48 | 5.81 | -    | 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  | V    |
|                                           |                           | I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 4.5 V                                                                        | -    | 0    | 0.1  | V    |
|                                           |                           | I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 6.0 V                                                                        | -    | 0    | 0.1  | V    |
|                                           |                           | I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V                                                                       | -    | 0.15 | 0.26 | V    |
|                                           |                           | I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V                                                                       | -    | 0.16 | 0.26 | 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 | µA   |
| I <sub>OZ</sub>                           | OFF-state output current  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V | -    | -    | ±0.5 | 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  | µA   |
| C <sub>I</sub>                            | input capacitance         |                                                                                                                        | -    | 3.5  | -    | pF   |
| <b>T<sub>amb</sub> = -40 °C to +85 °C</b> |                           |                                                                                                                        |      |      |      |      |
| V <sub>IH</sub>                           | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V                                                                                                | 1.5  | -    | -    | V    |
|                                           |                           | V <sub>CC</sub> = 4.5 V                                                                                                | 3.15 | -    | -    | V    |
|                                           |                           | V <sub>CC</sub> = 6.0 V                                                                                                | 4.2  | -    | -    | V    |
| V <sub>IL</sub>                           | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V                                                                                                | -    | -    | 0.5  | V    |
|                                           |                           | V <sub>CC</sub> = 4.5 V                                                                                                | -    | -    | 1.35 | V    |
|                                           |                           | V <sub>CC</sub> = 6.0 V                                                                                                | -    | -    | 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  | -    | -    | V    |
|                                           |                           | I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 4.5 V                                                                       | 4.4  | -    | -    | V    |
|                                           |                           | I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 6.0 V                                                                       | 5.9  | -    | -    | V    |
|                                           |                           | I <sub>O</sub> = -6.0 mA; V <sub>CC</sub> = 4.5 V                                                                      | 3.84 | -    | -    | V    |
|                                           |                           | I <sub>O</sub> = -7.8 mA; V <sub>CC</sub> = 6.0 V                                                                      | 5.34 | -    | -    | V    |

**Table 6.** Static characteristics 74HC366 ...continued

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

| Symbol                                     | Parameter                 | Conditions                                                                                                             | Min  | Typ | Max   | Unit |
|--------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------|------|-----|-------|------|
| 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                                                                        | -    | -   | 0.1   | V    |
|                                            |                           | I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 4.5 V                                                                        | -    | -   | 0.1   | V    |
|                                            |                           | I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 6.0 V                                                                        | -    | -   | 0.1   | V    |
|                                            |                           | I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V                                                                       | -    | -   | 0.33  | V    |
|                                            |                           | I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V                                                                       | -    | -   | 0.33  | 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;                                                      | -    | -   | ±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>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V | -    | -   | ±5.0  | 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                                 | -    | -   | 80    | µA   |
| <b>T<sub>amb</sub> = -40 °C to +125 °C</b> |                           |                                                                                                                        |      |     |       |      |
| V <sub>IH</sub>                            | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V                                                                                                | 1.5  | -   | -     | V    |
|                                            |                           | V <sub>CC</sub> = 4.5 V                                                                                                | 3.15 | -   | -     | V    |
|                                            |                           | V <sub>CC</sub> = 6.0 V                                                                                                | 4.2  | -   | -     | V    |
| V <sub>IL</sub>                            | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V                                                                                                | -    | -   | 0.5   | V    |
|                                            |                           | V <sub>CC</sub> = 4.5 V                                                                                                | -    | -   | 1.35  | V    |
|                                            |                           | V <sub>CC</sub> = 6.0 V                                                                                                | -    | -   | 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  | -   | -     | V    |
|                                            |                           | I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 4.5 V                                                                       | 4.4  | -   | -     | V    |
|                                            |                           | I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 6.0 V                                                                       | 5.9  | -   | -     | V    |
|                                            |                           | I <sub>O</sub> = -6.0 mA; V <sub>CC</sub> = 4.5 V                                                                      | 3.7  | -   | -     | V    |
|                                            |                           | I <sub>O</sub> = -7.8 mA; V <sub>CC</sub> = 6.0 V                                                                      | 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                                                                        | -    | -   | 0.1   | V    |
|                                            |                           | I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 4.5 V                                                                        | -    | -   | 0.1   | V    |
|                                            |                           | I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 6.0 V                                                                        | -    | -   | 0.1   | V    |
|                                            |                           | I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V                                                                       | -    | -   | 0.4   | V    |
|                                            |                           | I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V                                                                       | -    | -   | 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                                                       | -    | -   | ±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>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V | -    | -   | ±10.0 | 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                                 | -    | -   | 160   | µA   |

**Table 7.** Static characteristics 74HCT366

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

| Symbol                         | Parameter                 | Conditions                                                                    | Min  | Typ  | Max | Unit |
|--------------------------------|---------------------------|-------------------------------------------------------------------------------|------|------|-----|------|
| <b>T<sub>amb</sub> = 25 °C</b> |                           |                                                                               |      |      |     |      |
| V <sub>IH</sub>                | HIGH-level input voltage  | V <sub>CC</sub> = 4.5 V to 5.5 V                                              | 2.0  | 1.6  | -   | V    |
| V <sub>IL</sub>                | LOW-level input voltage   | V <sub>CC</sub> = 4.5 V to 5.5 V                                              | -    | 1.2  | 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  | -   | V    |
|                                |                           | I <sub>O</sub> = -6.0 mA                                                      | 3.98 | 4.32 | -   | V    |

**Table 7.** Static characteristics 74HCT366 ...continued

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

| Symbol                               | Parameter                 | Conditions                                                                                                                                                                                          | Min  | Typ  | Max   | Unit |
|--------------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-------|------|
| 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   | V    |
|                                      |                           | I <sub>O</sub> = 6.0 mA                                                                                                                                                                             | -    | 0.16 | 0.26  | 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  | μA   |
| I <sub>OZ</sub>                      | OFF-state output current  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = V <sub>CC</sub> or GND per input pin; other inputs at GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V | -    | -    | ±0.5  | 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> = 5.5 V                                                                                                              | -    | -    | 8.0   | μA   |
| ΔI <sub>CC</sub>                     | additional supply current | V <sub>I</sub> = V <sub>CC</sub> – 2.1 V; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A                                                                                              |      |      |       |      |
|                                      |                           | pins nA                                                                                                                                                                                             | -    | 100  | 360   | μA   |
|                                      |                           | pin $\overline{OE1}$                                                                                                                                                                                | -    | 100  | 360   | μA   |
|                                      |                           | pin $\overline{OE2}$                                                                                                                                                                                | -    | 90   | 320   | μA   |
| C <sub>I</sub>                       | input capacitance         |                                                                                                                                                                                                     | -    | 3.5  | -     | pF   |
| T <sub>amb</sub> = –40 °C to +85 °C  |                           |                                                                                                                                                                                                     |      |      |       |      |
| V <sub>IH</sub>                      | HIGH-level input voltage  | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                                                                                    | 2.0  | -    | -     | V    |
| V <sub>IL</sub>                      | LOW-level input voltage   | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                                                                                    | -    | -    | 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  | -    | -     | V    |
|                                      |                           | I <sub>O</sub> = –6.0 mA                                                                                                                                                                            | 3.84 | -    | -     | 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                                                                                                                                                                              | -    | -    | 0.1   | V    |
|                                      |                           | I <sub>O</sub> = 6.0 mA                                                                                                                                                                             | -    | -    | 0.33  | 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                                                                                                                                    | -    | -    | ±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>O</sub> = V <sub>CC</sub> or GND per input pin; other inputs at GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V |      |      | ±5.0  | 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> = 5.5 V                                                                                                              | -    | -    | 80    | μA   |
| ΔI <sub>CC</sub>                     | additional supply current | V <sub>I</sub> = V <sub>CC</sub> – 2.1 V; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A                                                                                              |      |      |       |      |
|                                      |                           | pins nA                                                                                                                                                                                             | -    | -    | 450   | μA   |
|                                      |                           | pin $\overline{OE1}$                                                                                                                                                                                | -    | -    | 450   | μA   |
|                                      |                           | pin $\overline{OE2}$                                                                                                                                                                                | -    | -    | 400   | μA   |
| T <sub>amb</sub> = –40 °C to +125 °C |                           |                                                                                                                                                                                                     |      |      |       |      |
| V <sub>IH</sub>                      | HIGH-level input voltage  | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                                                                                    | 2.0  | -    | -     | V    |
| V <sub>IL</sub>                      | LOW-level input voltage   | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                                                                                    | -    | -    | 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  | -    | -     | V    |
|                                      |                           | I <sub>O</sub> = –6.0 mA                                                                                                                                                                            | 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                                                                                                                                                                              | -    | -    | 0.1   | V    |
|                                      |                           | I <sub>O</sub> = 6.0 mA                                                                                                                                                                             | -    | -    | 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                                                                                                                                    | -    | -    | ±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>O</sub> = V <sub>CC</sub> or GND per input pin; other inputs at GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V | -    | -    | ±10.0 | μA   |

**Table 7.** Static characteristics 74HCT366 ...continued

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

| Symbol          | Parameter                 | Conditions                                                           | Min | Typ | Max | Unit    |
|-----------------|---------------------------|----------------------------------------------------------------------|-----|-----|-----|---------|
| $I_{CC}$        | supply current            | $V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V                 | -   | -   | 160 | $\mu$ A |
| $\Delta I_{CC}$ | additional supply current | $V_I = V_{CC} - 2.1$ V; other inputs at $V_{CC}$ or GND; $I_O = 0$ A |     |     |     |         |
|                 |                           | pins nA                                                              | -   | -   | 490 | $\mu$ A |
|                 |                           | pin $\overline{OE1}$                                                 | -   | -   | 490 | $\mu$ A |
|                 |                           | pin $\overline{OE2}$                                                 | -   | -   | 441 | $\mu$ A |

## 10. Dynamic characteristics

**Table 8.** Dynamic characteristics 74HC366Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; see test circuit [Figure 8](#).

| Symbol                                                      | Parameter                     | Conditions                                           | Min | Typ | Max | Unit |
|-------------------------------------------------------------|-------------------------------|------------------------------------------------------|-----|-----|-----|------|
| <b><math>T_{amb} = 25</math> °C</b>                         |                               |                                                      |     |     |     |      |
| $t_{pd}$                                                    | propagation delay             | nA to nY; see <a href="#">Figure 6</a>               | [1] |     |     |      |
|                                                             |                               | $V_{CC} = 2.0$ V                                     | -   | 33  | 100 | ns   |
|                                                             |                               | $V_{CC} = 4.5$ V                                     | -   | 12  | 20  | ns   |
|                                                             |                               | $V_{CC} = 5$ V; $C_L = 15$ pF                        | -   | 10  | -   | ns   |
|                                                             |                               | $V_{CC} = 6.0$ V                                     | -   | 10  | 17  | ns   |
| $t_{en}$                                                    | enable time                   | $\overline{OE}n$ to nY; see <a href="#">Figure 7</a> | [2] |     |     |      |
|                                                             |                               | $V_{CC} = 2.0$ V                                     | -   | 44  | 150 | ns   |
|                                                             |                               | $V_{CC} = 4.5$ V                                     | -   | 16  | 30  | ns   |
|                                                             |                               | $V_{CC} = 6.0$ V                                     | -   | 13  | 26  | ns   |
| $t_{dis}$                                                   | disable time                  | $\overline{OE}n$ to nY; see <a href="#">Figure 7</a> | [3] |     |     |      |
|                                                             |                               | $V_{CC} = 2.0$ V                                     | -   | 55  | 150 | ns   |
|                                                             |                               | $V_{CC} = 4.5$ V                                     | -   | 20  | 30  | ns   |
|                                                             |                               | $V_{CC} = 6.0$ V                                     | -   | 16  | 26  | ns   |
| $t_t$                                                       | transition time               | see <a href="#">Figure 6</a>                         | [4] |     |     |      |
|                                                             |                               | $V_{CC} = 2.0$ V                                     | -   | 14  | 60  | ns   |
|                                                             |                               | $V_{CC} = 4.5$ V                                     | -   | 5   | 12  | ns   |
|                                                             |                               | $V_{CC} = 6.0$ V                                     | -   | 4   | 10  | ns   |
| $C_{PD}$                                                    | power dissipation capacitance | per buffer; $V_I =$ GND to $V_{CC}$                  | [5] | -   | 30  | pF   |
| <b><math>T_{amb} = -40</math> °C to <math>+85</math> °C</b> |                               |                                                      |     |     |     |      |
| $t_{pd}$                                                    | propagation delay             | nA to nY; see <a href="#">Figure 6</a>               | [1] |     |     |      |
|                                                             |                               | $V_{CC} = 2.0$ V                                     | -   | -   | 125 | ns   |
|                                                             |                               | $V_{CC} = 4.5$ V                                     | -   | -   | 25  | ns   |
|                                                             |                               | $V_{CC} = 6.0$ V                                     | -   | -   | 21  | ns   |
| $t_{en}$                                                    | enable time                   | $\overline{OE}n$ to nY; see <a href="#">Figure 7</a> | [2] |     |     |      |
|                                                             |                               | $V_{CC} = 2.0$ V                                     | -   | -   | 190 | ns   |
|                                                             |                               | $V_{CC} = 4.5$ V                                     | -   | -   | 38  | ns   |
|                                                             |                               | $V_{CC} = 6.0$ V                                     | -   | -   | 33  | ns   |

**Table 8.** Dynamic characteristics 74HC366 ...continued

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; see test circuit [Figure 8](#).

| Symbol                               | Parameter         | Conditions                                               | Min | Typ | Max | Unit |
|--------------------------------------|-------------------|----------------------------------------------------------|-----|-----|-----|------|
| t <sub>dis</sub>                     | disable time      | $\overline{OEn}$ to nY; see <a href="#">Figure 7</a> [3] |     |     |     |      |
|                                      |                   | V <sub>CC</sub> = 2.0 V                                  | -   | -   | 190 | ns   |
|                                      |                   | V <sub>CC</sub> = 4.5 V                                  | -   | -   | 38  | ns   |
|                                      |                   | V <sub>CC</sub> = 6.0 V                                  | -   | -   | 33  | ns   |
| t <sub>t</sub>                       | transition time   | see <a href="#">Figure 6</a> [4]                         |     |     |     |      |
|                                      |                   | V <sub>CC</sub> = 2.0 V                                  | -   | -   | 75  | ns   |
|                                      |                   | V <sub>CC</sub> = 4.5 V                                  | -   | -   | 15  | ns   |
|                                      |                   | V <sub>CC</sub> = 6.0 V                                  | -   | -   | 13  | ns   |
| T <sub>amb</sub> = -40 °C to +125 °C |                   |                                                          |     |     |     |      |
| t <sub>pd</sub>                      | propagation delay | nA to nY; see <a href="#">Figure 6</a> [1]               |     |     |     |      |
|                                      |                   | V <sub>CC</sub> = 2.0 V                                  | -   | -   | 150 | ns   |
|                                      |                   | V <sub>CC</sub> = 4.5 V                                  | -   | -   | 30  | ns   |
|                                      |                   | V <sub>CC</sub> = 6.0 V                                  | -   | -   | 26  | ns   |
| t <sub>en</sub>                      | enable time       | $\overline{OEn}$ to nY; see <a href="#">Figure 7</a> [2] |     |     |     |      |
|                                      |                   | V <sub>CC</sub> = 2.0 V                                  | -   | -   | 225 | ns   |
|                                      |                   | V <sub>CC</sub> = 4.5 V                                  | -   | -   | 45  | ns   |
|                                      |                   | V <sub>CC</sub> = 6.0 V                                  | -   | -   | 38  | ns   |
| t <sub>dis</sub>                     | disable time      | $\overline{OEn}$ to nY; see <a href="#">Figure 7</a> [3] |     |     |     |      |
|                                      |                   | V <sub>CC</sub> = 2.0 V                                  | -   | -   | 225 | ns   |
|                                      |                   | V <sub>CC</sub> = 4.5 V                                  | -   | -   | 45  | ns   |
|                                      |                   | V <sub>CC</sub> = 6.0 V                                  | -   | -   | 38  | ns   |
| t <sub>t</sub>                       | transition time   | see <a href="#">Figure 6</a> [4]                         |     |     |     |      |
|                                      |                   | V <sub>CC</sub> = 2.0 V                                  | -   | -   | 90  | ns   |
|                                      |                   | V <sub>CC</sub> = 4.5 V                                  | -   | -   | 18  | ns   |
|                                      |                   | V <sub>CC</sub> = 6.0 V                                  | -   | -   | 15  | ns   |

[1]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ .

[2]  $t_{en}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .

[3]  $t_{dis}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .

[4]  $t_t$  is the same as  $t_{THL}$  and  $t_{TLH}$ .

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

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

**Table 9. Dynamic characteristics 74HCT366**

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; see test circuit [Figure 8](#).

| Symbol                                     | Parameter                     | Conditions                                                                           | Min | Typ | Max | Unit |
|--------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------|-----|-----|-----|------|
| <b>T<sub>amb</sub> = 25 °C</b>             |                               |                                                                                      |     |     |     |      |
| t <sub>pd</sub>                            | propagation delay             | nA to nY; see <a href="#">Figure 6</a>                                               | [1] |     |     |      |
|                                            |                               | V <sub>CC</sub> = 4.5 V                                                              | -   | 13  | 24  | ns   |
|                                            |                               | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF                                        | -   | 11  | -   | ns   |
| t <sub>en</sub>                            | enable time                   | $\overline{\text{OEn}}$ to nY; V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 7</a> | [2] | -   | 16  | 35   |
| t <sub>dis</sub>                           | disable time                  | $\overline{\text{OEn}}$ to nY; V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 7</a> | [3] | -   | 20  | 35   |
| t <sub>t</sub>                             | transition time               | V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 6</a>                                | [4] | -   | 5   | 12   |
| C <sub>PD</sub>                            | power dissipation capacitance | per buffer; V <sub>I</sub> = GND to (V <sub>CC</sub> – 1.5 V)                        | [5] | -   | 30  | pF   |
| <b>T<sub>amb</sub> = –40 °C to +85 °C</b>  |                               |                                                                                      |     |     |     |      |
| t <sub>pd</sub>                            | propagation delay             | nA to nY; V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 6</a>                      | [1] | -   | -   | 30   |
| t <sub>en</sub>                            | enable time                   | $\overline{\text{OEn}}$ to nY; V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 7</a> | [2] | -   | -   | 44   |
| t <sub>dis</sub>                           | disable time                  | $\overline{\text{OEn}}$ to nY; V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 7</a> | [3] | -   | -   | 44   |
| t <sub>t</sub>                             | transition time               | V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 6</a>                                | [4] | -   | -   | 15   |
| <b>T<sub>amb</sub> = –40 °C to +125 °C</b> |                               |                                                                                      |     |     |     |      |
| t <sub>pd</sub>                            | propagation delay             | nA to nY; V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 6</a>                      | [1] | -   | -   | 36   |
| t <sub>en</sub>                            | enable time                   | $\overline{\text{OEn}}$ to nY; V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 7</a> | [2] | -   | -   | 53   |
| t <sub>dis</sub>                           | disable time                  | $\overline{\text{OEn}}$ to nY; V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 7</a> | [3] | -   | -   | 53   |
| t <sub>t</sub>                             | transition time               | V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 6</a>                                | [4] | -   | -   | 18   |

[1] t<sub>pd</sub> is the same as t<sub>PHL</sub> and t<sub>PLH</sub>.

[2] t<sub>en</sub> is the same as t<sub>PZH</sub> and t<sub>PZL</sub>.

[3] t<sub>dis</sub> is the same as t<sub>PHZ</sub> and t<sub>PLZ</sub>.

[4] t<sub>t</sub> is the same as t<sub>THL</sub> and t<sub>TLH</sub>.

[5] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).

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

f<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

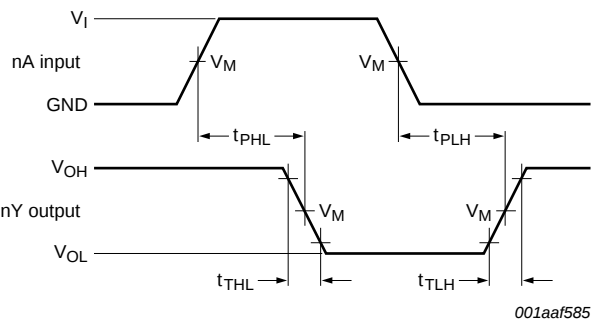
C<sub>L</sub> = output load capacitance in pF;

V<sub>CC</sub> = supply voltage in V;

N = number of inputs switching;

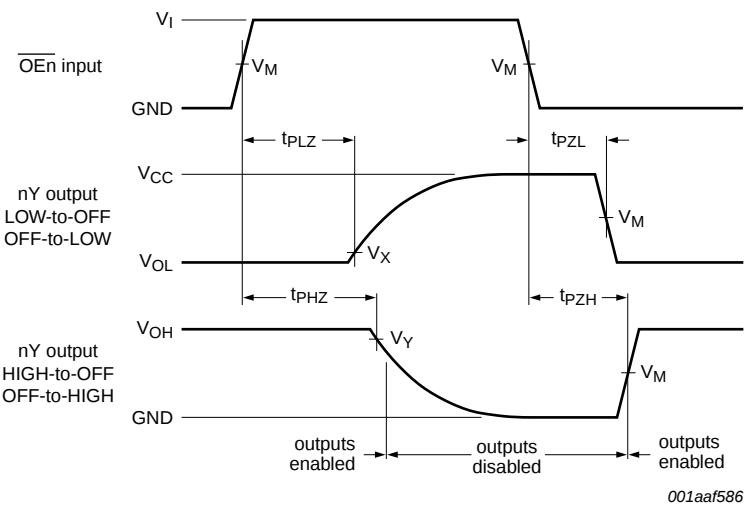
$\Sigma(C_L \times V_{CC}^2 \times f_o)$  = sum of outputs.

11. Waveforms



Measurement points are given in [Table 10](#).  
 $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

**Fig 6. Propagation delay data input (nA) to output (nY) and output transition time**

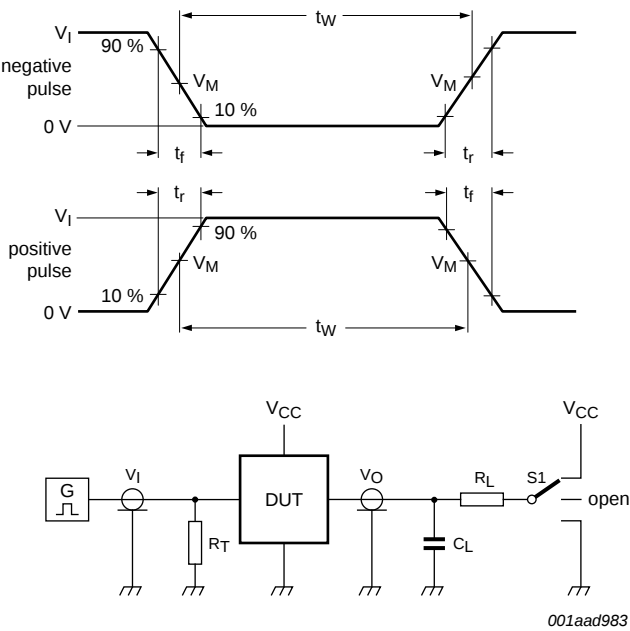


Measurement points are given in [Table 10](#).  
 $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

**Fig 7. 3-state enable and disable times**

**Table 10. Measurement points**

| Type     | Input       | Output      |                     |                     |
|----------|-------------|-------------|---------------------|---------------------|
|          | $V_M$       | $V_M$       | $V_X$               | $V_Y$               |
| 74HC366  | $0.5V_{CC}$ | $0.5V_{CC}$ | $0.1 \times V_{CC}$ | $0.9 \times V_{CC}$ |
| 74HCT366 | 1.3 V       | 1.3 V       | $0.1 \times V_{CC}$ | $0.9 \times V_{CC}$ |



Test data is given in [Table 11](#).  
Definitions test circuit:  
 $R_T$  = Termination resistance should be equal to output impedance  $Z_o$  of the pulse generator  
 $C_L$  = Load capacitance including jig and probe capacitance  
 $R_L$  = Load resistor  
 $S1$  = Test selection switch

Fig 8. Load circuitry for measuring switching times

Table 11. Test data

| Type     | Input    |            | Load         |              | S1 position        |                    |                    |
|----------|----------|------------|--------------|--------------|--------------------|--------------------|--------------------|
|          | $V_I$    | $t_r, t_f$ | $C_L$        | $R_L$        | $t_{PHL}, t_{PLH}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ |
| 74HC366  | $V_{CC}$ | 6 ns       | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |
| 74HCT366 | 3 V      | 6 ns       | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |

12. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mmSOT109-1

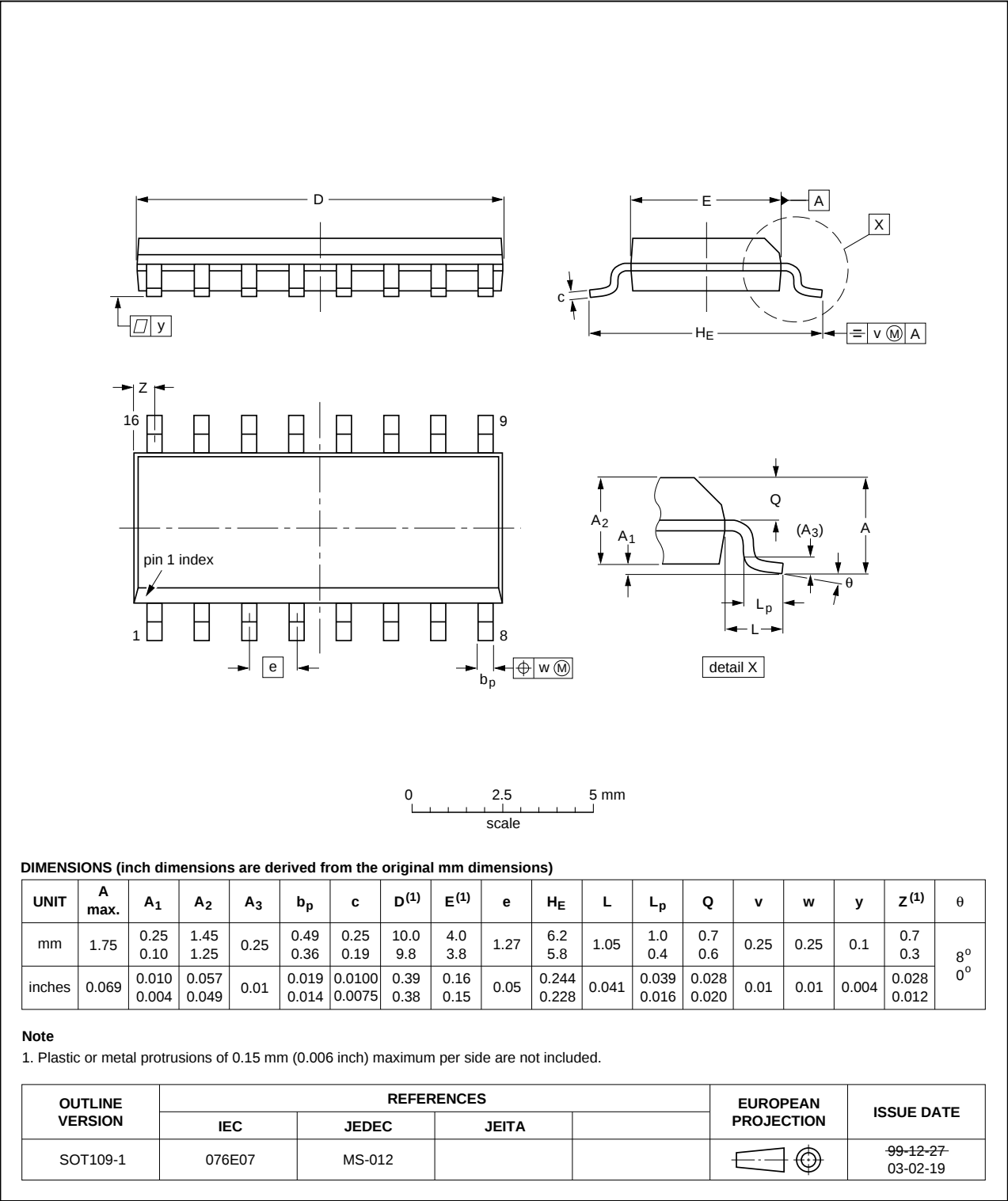


Fig 9. Package outline SOT109-1 (SO16)

SSOP16: plastic shrink small outline package; 16 leads; body width 5.3 mm

SOT338-1

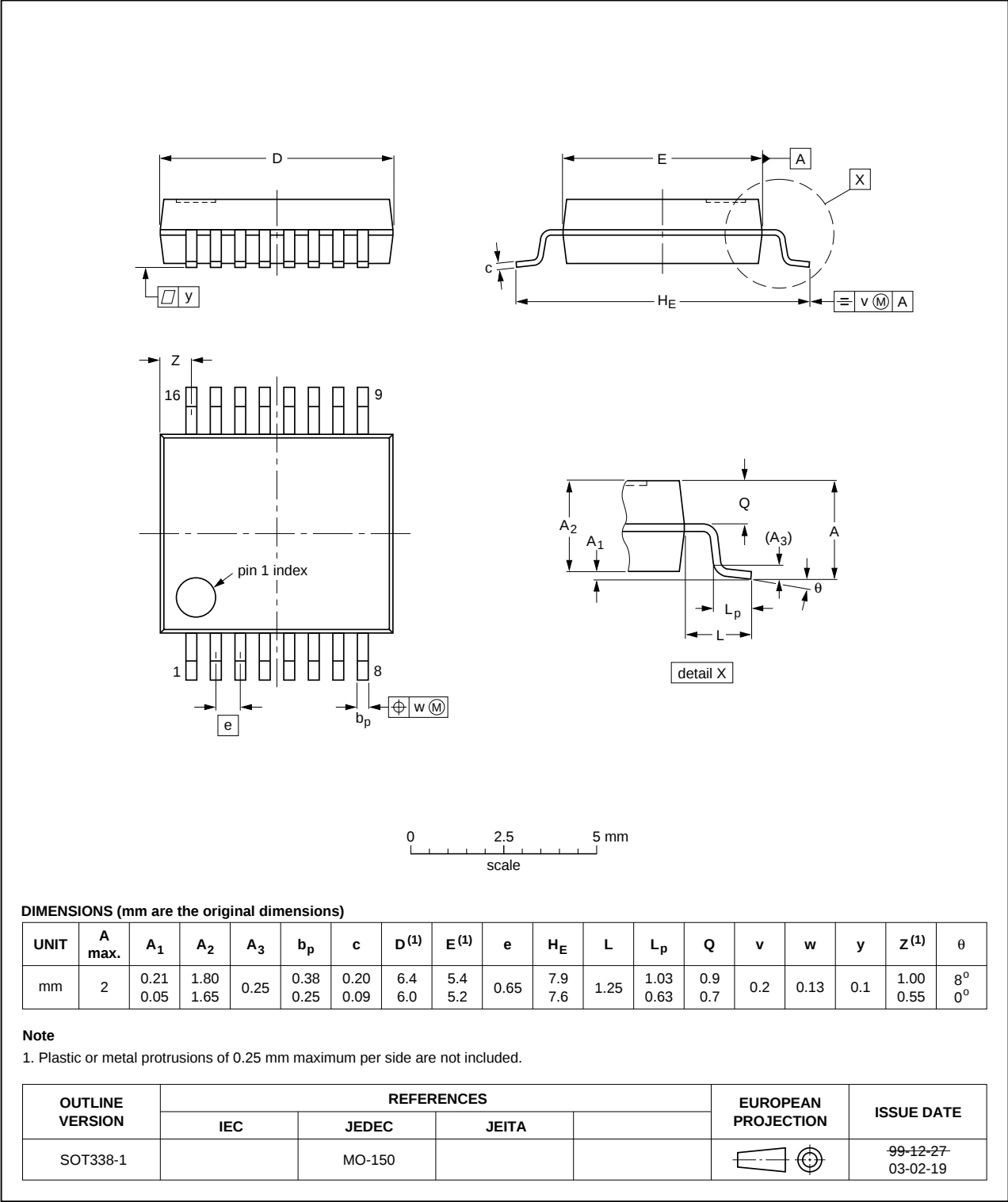


Fig 10. Package outline SOT338-1 (SSOP16)

DIP16: plastic dual in-line package; 16 leads (300 mil); long body

SOT38-1

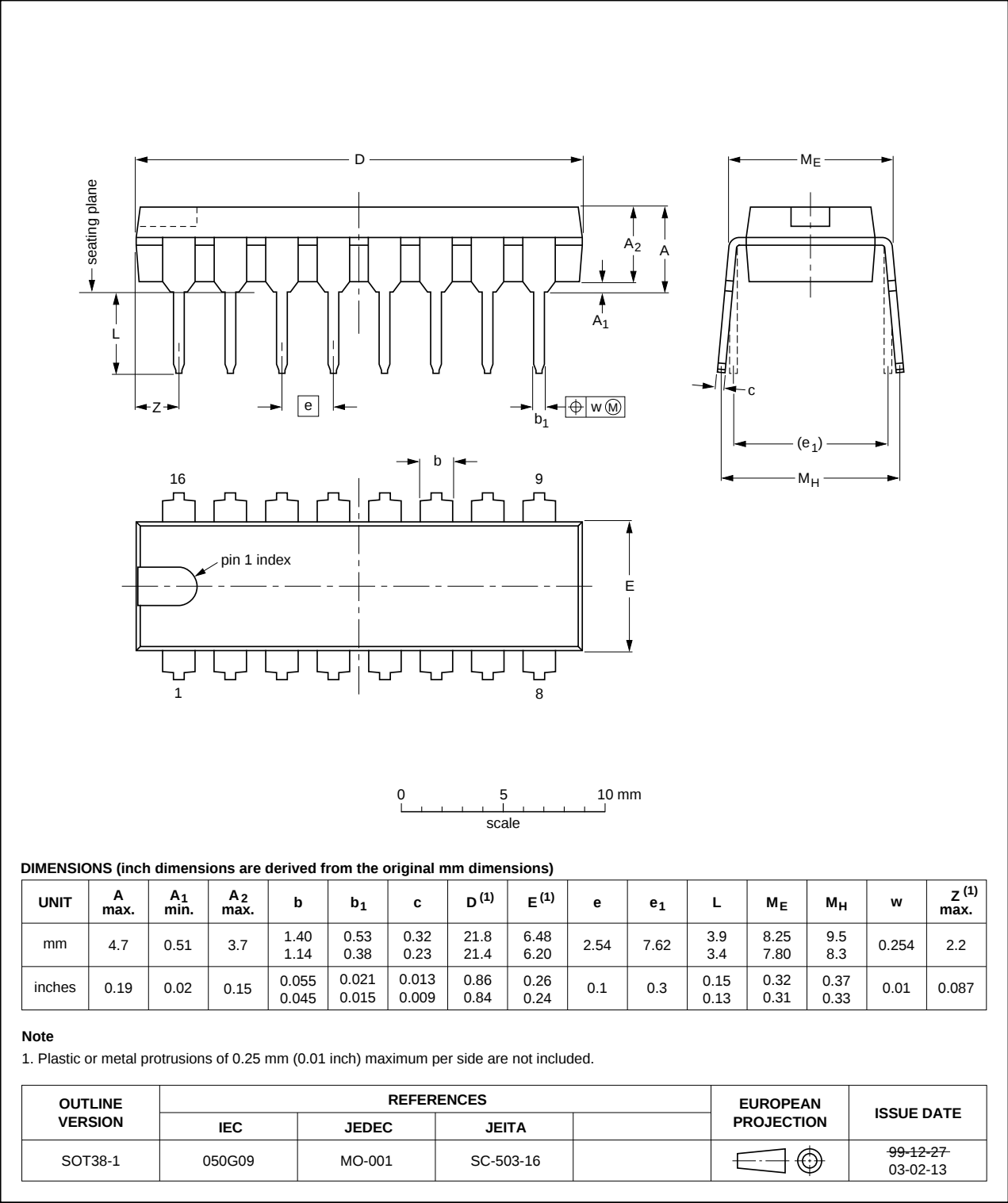


Fig 11. Package outline SOT38-1 (DIP16)

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

SOT403-1

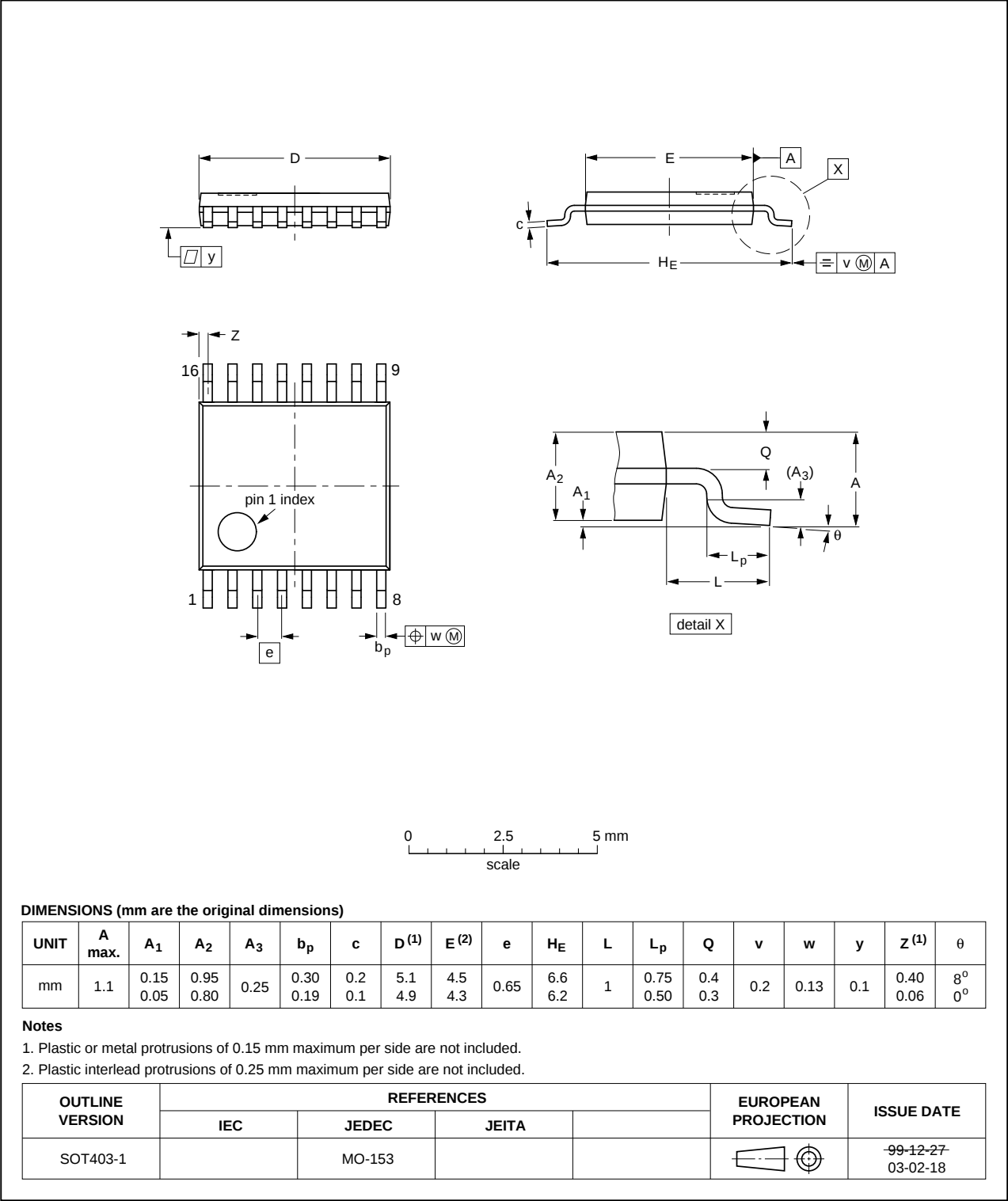


Fig 12. Package outline SOT403-1 (TSSOP16)

## 13. Abbreviations

Table 12. Abbreviations

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

## 14. Revision history

Table 13. Revision history

| Document ID         | Release date           | Data sheet status     | Change notice | Supersedes          |
|---------------------|------------------------|-----------------------|---------------|---------------------|
| 74HC_HCT366 v.4     | 20120904               | Product data sheet    | -             | 74HC_HCT366 v.3     |
| Modifications:      | • Legal pages updated. |                       |               |                     |
| 74HC_HCT366 v.3     | 20061121               | Product data sheet    | -             | 74HC_HCT366_CNV v.2 |
| 74HC_HCT366_CNV v.2 | 19901201               | Product specification | -             | -                   |

## 15. Legal information

### 15.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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