

# 74LVC16373A; 74LVCH16373A

16-bit D-type transparent latch with 5 V tolerant inputs/outputs; 3-state

Rev. 8 — 6 January 2014

Product data sheet

## 1. General description

The 74LVC16373A and 74LVCH16373A are 16-bit D-type transparent latches featuring separate D-type inputs with bus hold (74LVCH16373A only) for each latch and 3-state outputs for bus-oriented applications. One Latch Enable (LE) input and one Output Enable ( $\overline{OE}$ ) are provided for each octal. Inputs can be driven from either 3.3 V or 5 V devices. When disabled, up to 5.5 V can be applied to the outputs. These features allow the use of these devices in mixed 3.3 V and 5 V applications.

The device consists of two sections of eight D-type transparent latches with 3-state true outputs. When LE is HIGH, data at the D<sub>n</sub> inputs enter the latches. In this condition, the latches are transparent, that is, the latch outputs change each time its corresponding D-input changes. The latches store the information that was present at the D-inputs one set-up time ( $t_{su}$ ) preceding the HIGH-to-LOW transition of LE. When  $\overline{OE}$  is LOW, the contents of the eight latches are available at the outputs. When  $\overline{OE}$  is HIGH, the outputs go to the high impedance OFF-state. Operation of the  $\overline{OE}$  input does not affect the state of the latches. Bus hold on the data inputs eliminates the need for external pull-up resistors to hold unused inputs.

## 2. Features and benefits

- 5 V tolerant inputs/outputs for interfacing with 5 V logic
- Wide supply voltage range from 1.2 V to 3.6 V
- CMOS low power consumption
- Multibyte flow-through standard pinout architecture
- Multiple low inductance supply pins for minimum noise and ground bounce
- Direct interface with TTL levels
- All data inputs have bus hold (74LVCH16373A only)
- High-impedance when  $V_{CC} = 0$  V
- Complies with JEDEC standard:
  - ◆ JESD8-7A (1.65 V to 1.95 V)
  - ◆ JESD8-5A (2.3 V to 2.7 V)
  - ◆ JESD8-C/JESD36 (2.7 V to 3.6 V)
- ESD protection:
  - ◆ HBM JESD22-A114F exceeds 2000 V
  - ◆ MM JESD22-A115-B exceeds 200 V
  - ◆ CDM JESD22-C101E exceeds 1000 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   |          |
| 74LVC16373ADGG<br>74LVCH16373ADGG | -40 °C to +125 °C | TSSOP48 | plastic thin shrink small outline package;<br>48 leads; body width 6.1 mm | SOT362-1 |
| 74LVC16373ADL<br>74LVCH16373ADL   | -40 °C to +125 °C | SSOP48  | plastic shrink small outline package; 48 leads;<br>body width 7.5 mm      | SOT370-1 |

### 4. Functional diagram

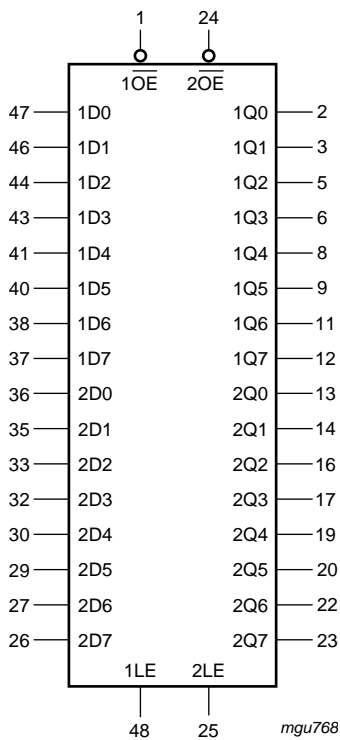


Fig 1. Logic symbol

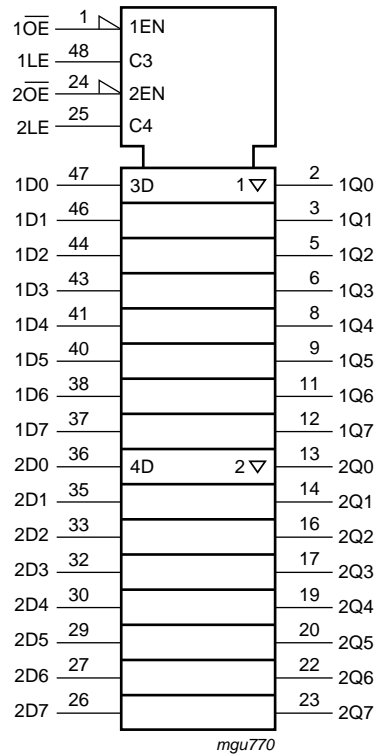
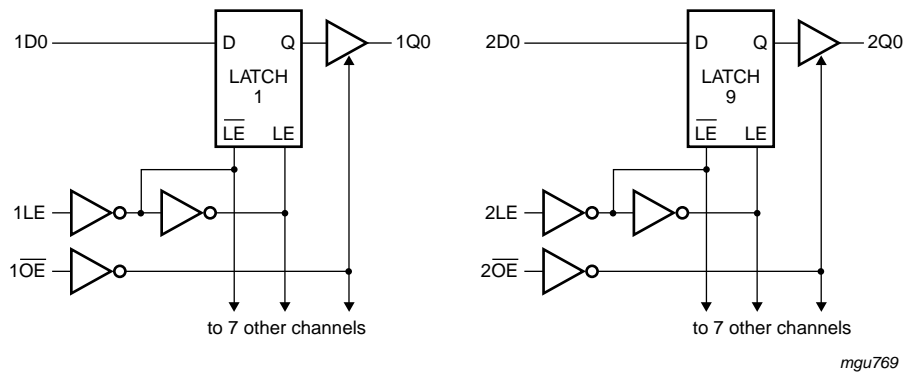
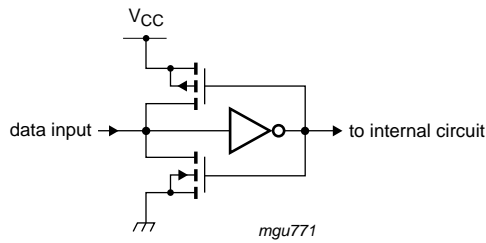


Fig 2. IEC logic symbol



**Fig 3. Logic diagram**



**Fig 4. Bus hold circuit**

## 5. Pinning information

### 5.1 Pinning

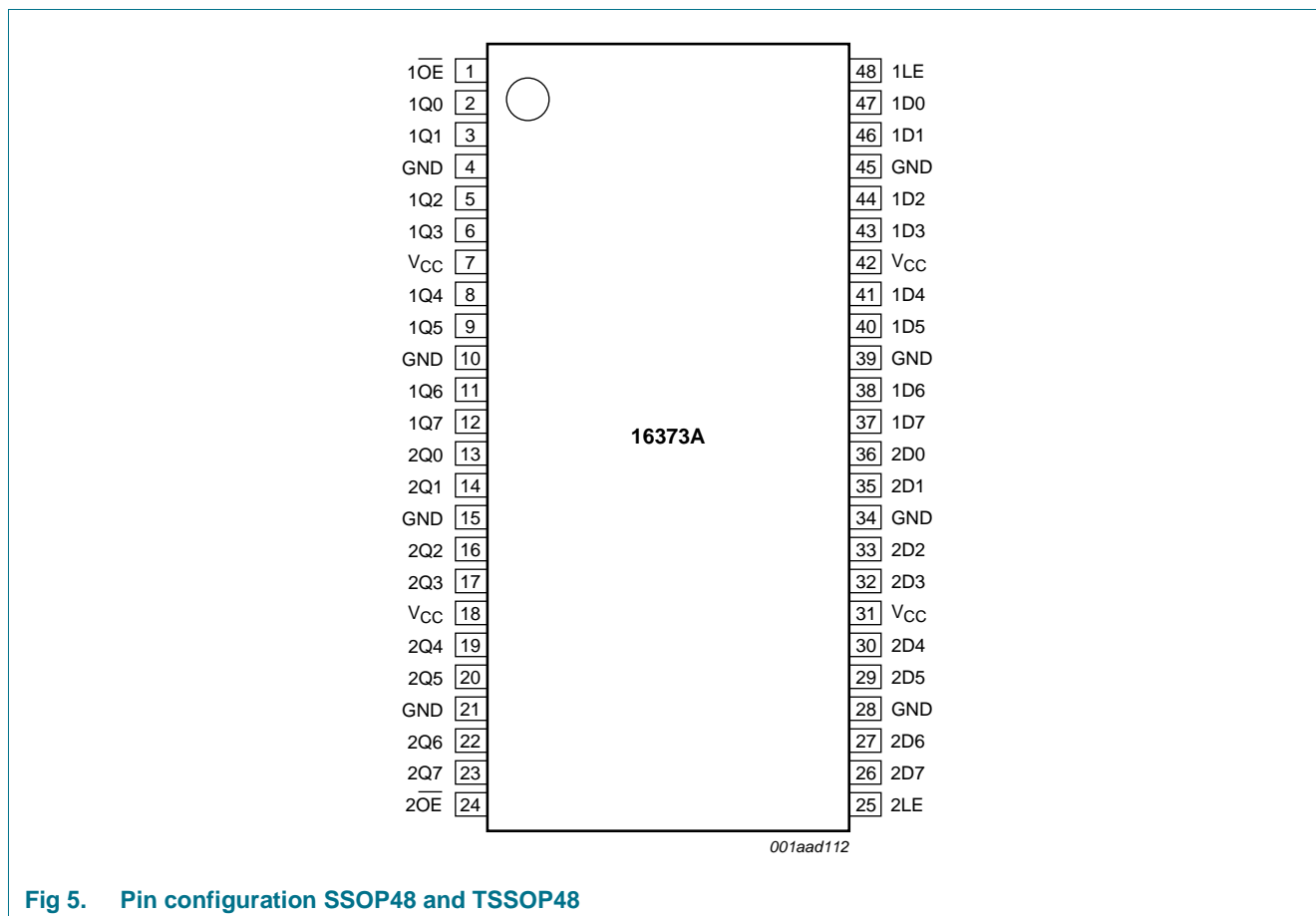


Fig 5. Pin configuration SSOP48 and TSSOP48

### 5.2 Pin description

Table 2. Pin description

| Symbol  | Pin                            | Description                      |
|---------|--------------------------------|----------------------------------|
| 1OE     | 1                              | output enable input (active LOW) |
| 2OE     | 24                             | output enable input (active LOW) |
| 1LE     | 48                             | latch enable input (active HIGH) |
| 2LE     | 25                             | latch enable input (active HIGH) |
| GND     | 4, 10, 15, 21, 28, 34, 39, 45  | ground (0 V)                     |
| VCC     | 7, 18, 31, 42                  | supply voltage                   |
| 1Q[0:7] | 2, 3, 5, 6, 8, 9, 11, 12       | data output                      |
| 2Q[0:7] | 13, 14, 16, 17, 19, 20, 22, 23 | data output                      |
| 1D[0:7] | 47, 46, 44, 43, 41, 40, 38, 37 | data input                       |
| 2D[0:7] | 36, 35, 33, 32, 30, 29, 27, 26 | data input                       |

## 6. Functional description

**Table 3. Function table**

Per section of eight bits [1].

| Operating modes                                | Input |     |     | Internal latch | Output<br>nQ0 to nQ7 |
|--|-------|-----|-----|----------------|----------------------|
|  | nOE   | nLE | nDn |                |                      |
| Enable and read register<br>(transparent mode) | L     | H   | L   | L              | L                    |
|  | L     | H   | H   | H              | H                    |
| Latch and read register                        | L     | L   | l   | L              | L                    |
|  | L     | L   | h   | H              | H                    |
| Latch register and disable outputs             | H     | L   | l   | L              | Z                    |
|  | H     | L   | h   | H              | Z                    |

- [1] H = HIGH voltage level  
 h = HIGH voltage level one set-up time prior to the HIGH to LOW LE transition  
 L = LOW voltage level  
 l = LOW voltage level one set-up time prior to the HIGH to LOW LE transition  
 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 <sub>CC</sub>  | supply voltage          |  | -0.5     | +6.5                  | V    |
| I <sub>IK</sub>  | input clamping current  | V <sub>I</sub> < 0                                     | -50      | -                     | mA   |
| V <sub>I</sub>   | input voltage           |  | [1] -0.5 | +6.5                  | V    |
| I <sub>OK</sub>  | output clamping current | V <sub>O</sub> > V <sub>CC</sub> or V <sub>O</sub> < 0 | -        | ±50                   | mA   |
| V <sub>O</sub>   | output voltage          | output HIGH or LOW state                               | [2] -0.5 | V <sub>CC</sub> + 0.5 | V    |
|                  |                         | output 3-state   | [2] -0.5 | +6.5                  | V    |
| I <sub>O</sub>   | output current          | V <sub>O</sub> = 0 V to V <sub>CC</sub>                | -        | ±50                   | mA   |
| I <sub>CC</sub>  | supply current          |  | -        | 100                   | mA   |
| I <sub>GND</sub> | ground current          |  | -100     | -                     | mA   |
| T <sub>stg</sub> | storage temperature     |  | -65      | +150                  | °C   |
| P <sub>tot</sub> | total power dissipation | T <sub>amb</sub> = -40 °C to +125 °C                   | [3] -    | 500                   | mW   |

- [1] The minimum input voltage ratings may be exceeded if the input current ratings are observed.  
 [2] The output voltage ratings may be exceeded if the output current ratings are observed.  
 [3] Above 60 °C, the value of P<sub>tot</sub> derates linearly with 5.5 mW/K.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

| Symbol           | Parameter                           | Conditions                        | Min  | Typ | Max             | Unit |
|------------------|-------------------------------------|-----------------------------------|------|-----|-----------------|------|
| V <sub>CC</sub>  | supply voltage                      |                                   | 1.65 | -   | 3.6             | V    |
|                  |                                     | functional                        | 1.2  | -   | 3.6             | V    |
| V <sub>I</sub>   | input voltage                       |                                   | 0    | -   | 5.5             | V    |
| V <sub>O</sub>   | output voltage                      | output HIGH or LOW state          | 0    | -   | V <sub>CC</sub> | V    |
|                  |                                     | output 3-state                    | 0    | -   | 5.5             | V    |
| T <sub>amb</sub> | ambient temperature                 | in free air                       | -40  | -   | +125            | °C   |
| Δt/ΔV            | input transition rise and fall rate | V <sub>CC</sub> = 1.65 V to 2.7 V | 0    | -   | 20              | ns/V |
|                  |                                     | V <sub>CC</sub> = 2.7 V to 3.6 V  | 0    | -   | 10              | ns/V |

## 9. Static characteristics

**Table 6. Static characteristics**

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

| Symbol          | Parameter                 | Conditions  | -40 °C to +85 °C       |                    |                        | -40 °C to +125 °C      |                        | Unit |
|-----------------|---------------------------|---|------------------------|--------------------|------------------------|------------------------|------------------------|------|
|                 |                           |   | Min                    | Typ <sup>[1]</sup> | Max                    | Min                    | Max                    |      |
| V <sub>IH</sub> | HIGH-level input voltage  | V <sub>CC</sub> = 1.2 V   | 1.08                   | -                  | -                      | 1.08                   | -                      | V    |
|                 |                           | V <sub>CC</sub> = 1.65 V to 1.95 V                                    | 0.65 × V <sub>CC</sub> | -                  | -                      | 0.65 × V <sub>CC</sub> | -                      | V    |
|                 |                           | V <sub>CC</sub> = 2.3 V to 2.7 V                                      | 1.7                    | -                  | -                      | 1.7                    | -                      | V    |
|                 |                           | V <sub>CC</sub> = 2.7 V to 3.6 V                                      | 2.0                    | -                  | -                      | 2.0                    | -                      | V    |
| V <sub>IL</sub> | LOW-level input voltage   | V <sub>CC</sub> = 1.2 V   | -                      | -                  | 0.12                   | -                      | 0.12                   | V    |
|                 |                           | V <sub>CC</sub> = 1.65 V to 1.95 V                                    | -                      | -                  | 0.35 × V <sub>CC</sub> | -                      | 0.35 × V <sub>CC</sub> | V    |
|                 |                           | V <sub>CC</sub> = 2.3 V to 2.7 V                                      | -                      | -                  | 0.7                    | -                      | 0.7                    | V    |
|                 |                           | V <sub>CC</sub> = 2.7 V to 3.6 V                                      | -                      | -                  | 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>                   |                        |                    |                        |                        |                        |      |
|                 |                           | I <sub>O</sub> = -100 μA; V <sub>CC</sub> = 1.65 V to 3.6 V           | V <sub>CC</sub> - 0.2  | -                  | -                      | V <sub>CC</sub> - 0.3  | -                      | V    |
|                 |                           | I <sub>O</sub> = -4 mA; V <sub>CC</sub> = 1.65 V                      | 1.2                    | -                  | -                      | 1.05                   | -                      | V    |
|                 |                           | I <sub>O</sub> = -8 mA; V <sub>CC</sub> = 2.3 V                       | 1.8                    | -                  | -                      | 1.65                   | -                      | V    |
|                 |                           | I <sub>O</sub> = -12 mA; V <sub>CC</sub> = 2.7 V                      | 2.2                    | -                  | -                      | 2.05                   | -                      | V    |
|                 |                           | I <sub>O</sub> = -18 mA; V <sub>CC</sub> = 3.0 V                      | 2.4                    | -                  | -                      | 2.25                   | -                      | V    |
| V <sub>OL</sub> | LOW-level output voltage  | I <sub>O</sub> = -24 mA; V <sub>CC</sub> = 3.0 V                      | 2.2                    | -                  | -                      | 2.0                    | -                      | V    |
|                 |                           | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                   |                        |                    |                        |                        |                        |      |
|                 |                           | I <sub>O</sub> = 100 μA; V <sub>CC</sub> = 1.65 V to 3.6 V            | -                      | -                  | 0.2                    | -                      | 0.3                    | V    |
|                 |                           | I <sub>O</sub> = 4 mA; V <sub>CC</sub> = 1.65 V                       | -                      | -                  | 0.45                   | -                      | 0.65                   | V    |
|                 |                           | I <sub>O</sub> = 8 mA; V <sub>CC</sub> = 2.3 V                        | -                      | -                  | 0.6                    | -                      | 0.8                    | V    |
|                 |                           | I <sub>O</sub> = 12 mA; V <sub>CC</sub> = 2.7 V                       | -                      | -                  | 0.4                    | -                      | 0.6                    | V    |
| I <sub>I</sub>  | input leakage current     | I <sub>O</sub> = 24 mA; V <sub>CC</sub> = 3.0 V                       | -                      | -                  | 0.55                   | -                      | 0.8                    | V    |
|                 |                           | V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = 5.5 V or GND <sup>[2]</sup> | -                      | ±0.1               | ±5                     | -                      | ±20                    | μA   |

**Table 6. Static characteristics ...continued**

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

| Symbol            | Parameter                       | Conditions  | -40 °C to +85 °C |                    |     | -40 °C to +125 °C |      | Unit |
|-------------------|---------------------------------|---|------------------|--------------------|-----|-------------------|------|------|
|                   |                                 |   | Min              | Typ <sup>[1]</sup> | Max | Min               | Max  |      |
| 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> = 3.6 V; V <sub>O</sub> = 5.5 V or GND <sup>[2]</sup> | -                | ±0.1               | ±5  | -                 | ±20  | μA   |
| I <sub>OFF</sub>  | power-off leakage current       | V <sub>CC</sub> = 0 V; V <sub>I</sub> or V <sub>O</sub> = 5.5 V   | -                | ±0.1               | ±10 | -                 | ±20  | μA   |
| I <sub>CC</sub>   | supply current                  | V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A                                      | -                | 0.1                | 20  | -                 | 80   | μA   |
| ΔI <sub>CC</sub>  | additional supply current       | per input pin; V <sub>CC</sub> = 2.7 V to 3.6 V; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A             | -                | 5                  | 500 | -                 | 5000 | μA   |
| C <sub>I</sub>    | input capacitance               | V <sub>CC</sub> = 0 V to 3.6 V; V <sub>I</sub> = GND to V <sub>CC</sub>   | -                | 5.0                | -   | -                 | -    | pF   |
| I <sub>BHL</sub>  | bus hold LOW current            | V <sub>CC</sub> = 1.65; V <sub>I</sub> = 0.58 V <sup>[3][4]</sup>   | 10               | -                  | -   | 10                | -    | μA   |
|                   |                                 | V <sub>CC</sub> = 2.3; V <sub>I</sub> = 0.7 V   | 30               | -                  | -   | 25                | -    | μA   |
|                   |                                 | V <sub>CC</sub> = 3.0; V <sub>I</sub> = 0.8 V   | 75               | -                  | -   | 60                | -    | μA   |
| I <sub>BHH</sub>  | bus hold HIGH current           | V <sub>CC</sub> = 1.65; V <sub>I</sub> = 1.07 V <sup>[3][4]</sup>   | -10              | -                  | -   | -10               | -    | μA   |
|                   |                                 | V <sub>CC</sub> = 2.3; V <sub>I</sub> = 1.7 V   | -30              | -                  | -   | -25               | -    | μA   |
|                   |                                 | V <sub>CC</sub> = 3.0; V <sub>I</sub> = 2.0 V   | -75              | -                  | -   | -60               | -    | μA   |
| I <sub>BHLO</sub> | bus hold LOW overdrive current  | V <sub>CC</sub> = 1.95 V <sup>[3][5]</sup>  | 200              | -                  | -   | 200               | -    | μA   |
|                   |                                 | V <sub>CC</sub> = 2.7 V   | 300              | -                  | -   | 300               | -    | μA   |
|                   |                                 | V <sub>CC</sub> = 3.6 V   | 500              | -                  | -   | 500               | -    | μA   |
| I <sub>BHHO</sub> | bus hold HIGH overdrive current | V <sub>CC</sub> = 1.95 V <sup>[3][5]</sup>  | -200             | -                  | -   | -200              | -    | μA   |
|                   |                                 | V <sub>CC</sub> = 2.7 V   | -300             | -                  | -   | -300              | -    | μA   |
|                   |                                 | V <sub>CC</sub> = 3.6 V   | -500             | -                  | -   | -500              | -    | μA   |

[1] All typical values are measured at V<sub>CC</sub> = 3.3 V (unless stated otherwise) and T<sub>amb</sub> = 25 °C.[2] The bus hold circuit is switched off when V<sub>I</sub> > V<sub>CC</sub> allowing 5.5 V on the input pin.

[3] Valid for data inputs (74LVCH16373A) only; control inputs do not have a bus hold circuit.

[4] The specified sustaining current at the data inputs holds the input below the specified V<sub>I</sub> level.

[5] The specified overdrive current at the data input forces the data input to the opposite logic input state.

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

 Voltages are referenced to GND (ground = 0 V). For test circuit see [Figure 10](#).

| Symbol           | Parameter         | Conditions  | T <sub>amb</sub> = -40 °C to +85 °C |                    |      | -40 °C to +125 °C |      | Unit |
|------------------|-------------------|---|-------------------------------------|--------------------|------|-------------------|------|------|
|                  |                   |   | Min                                 | Typ <sup>[1]</sup> | Max  | Min               | Max  |      |
| t <sub>pd</sub>  | propagation delay | Dn to Qn; see <a href="#">Figure 6</a> <span style="float: right;">[2]</span> |                                     |                    |      |                   |      |      |
|                  |                   | V <sub>CC</sub> = 1.2 V   | -                                   | 12                 | -    | -                 | -    | ns   |
|                  |                   | V <sub>CC</sub> = 1.65 V to 1.95 V  | 1.5                                 | 5.4                | 11.4 | 1.5               | 13.2 | ns   |
|                  |                   | V <sub>CC</sub> = 2.3 V to 2.7 V  | 1.0                                 | 2.9                | 5.7  | 1.0               | 6.6  | ns   |
|                  |                   | V <sub>CC</sub> = 2.7 V   | 1.5                                 | 2.9                | 4.9  | 1.5               | 6.5  | ns   |
|                  |                   | V <sub>CC</sub> = 3.0 V to 3.6 V  | 1.0                                 | 2.4                | 4.4  | 1.0               | 5.5  | ns   |
|                  |                   | LE to Qn; see <a href="#">Figure 7</a>  |                                     |                    |      |                   |      |      |
|                  |                   | V <sub>CC</sub> = 1.2 V   | -                                   | 14                 | -    | -                 | -    | ns   |
|                  |                   | V <sub>CC</sub> = 1.65 V to 1.95 V  | 2.0                                 | 6.4                | 12.4 | 2.0               | 14.4 | ns   |
|                  |                   | V <sub>CC</sub> = 2.3 V to 2.7 V  | 1.5                                 | 3.4                | 6.1  | 1.5               | 7.1  | ns   |
| t <sub>en</sub>  | enable time       | OE to Qn; see <a href="#">Figure 8</a> <span style="float: right;">[2]</span> |                                     |                    |      |                   |      |      |
|                  |                   | V <sub>CC</sub> = 1.2 V   | -                                   | 18                 | -    | -                 | -    | ns   |
|                  |                   | V <sub>CC</sub> = 1.65 V to 1.95 V  | 1.5                                 | 5.5                | 12.4 | 1.5               | 14.3 | ns   |
|                  |                   | V <sub>CC</sub> = 2.3 V to 2.7 V  | 1.0                                 | 3.1                | 6.6  | 1.0               | 7.6  | ns   |
|                  |                   | V <sub>CC</sub> = 2.7 V   | 1.5                                 | 3.3                | 5.7  | 1.5               | 7.5  | ns   |
| t <sub>dis</sub> | disable time      | OE to Qn; see <a href="#">Figure 8</a> <span style="float: right;">[2]</span> |                                     |                    |      |                   |      |      |
|                  |                   | V <sub>CC</sub> = 1.2 V   | -                                   | 11                 | -    | -                 | -    | ns   |
|                  |                   | V <sub>CC</sub> = 1.65 V to 1.95 V  | 2.8                                 | 4.5                | 9.1  | 2.8               | 10.5 | ns   |
|                  |                   | V <sub>CC</sub> = 2.3 V to 2.7 V  | 1.0                                 | 2.5                | 5.1  | 1.0               | 6.0  | ns   |
|                  |                   | V <sub>CC</sub> = 2.7 V   | 1.5                                 | 3.3                | 6.3  | 1.5               | 8.0  | ns   |
| t <sub>w</sub>   | pulse width       | LE HIGH; see <a href="#">Figure 7</a>   |                                     |                    |      |                   |      |      |
|                  |                   | V <sub>CC</sub> = 1.65 V to 1.95 V  | 5.0                                 | -                  | -    | 5.0               | -    | ns   |
|                  |                   | V <sub>CC</sub> = 2.3 V to 2.7 V  | 4.0                                 | -                  | -    | 4.0               | -    | ns   |
|                  |                   | V <sub>CC</sub> = 2.7 V   | 3.0                                 | -                  | -    | 3.0               | -    | ns   |
|                  |                   | V <sub>CC</sub> = 3.0 V to 3.6 V  | 3.0                                 | 2.0                | -    | 3.0               | -    | ns   |
| t <sub>su</sub>  | set-up time       | Dn to LE; see <a href="#">Figure 9</a>  |                                     |                    |      |                   |      |      |
|                  |                   | V <sub>CC</sub> = 1.65 V to 1.95 V  | 3.0                                 | -                  | -    | 3.0               | -    | ns   |
|                  |                   | V <sub>CC</sub> = 2.3 V to 2.7 V  | 2.5                                 | -                  | -    | 2.5               | -    | ns   |
|                  |                   | V <sub>CC</sub> = 2.7 V   | 2.0                                 | -                  | -    | 2.0               | -    | ns   |
|                  |                   | V <sub>CC</sub> = 3.0 V to 3.6 V  | 2.0                                 | 1.0                | -    | 2.0               | -    | ns   |



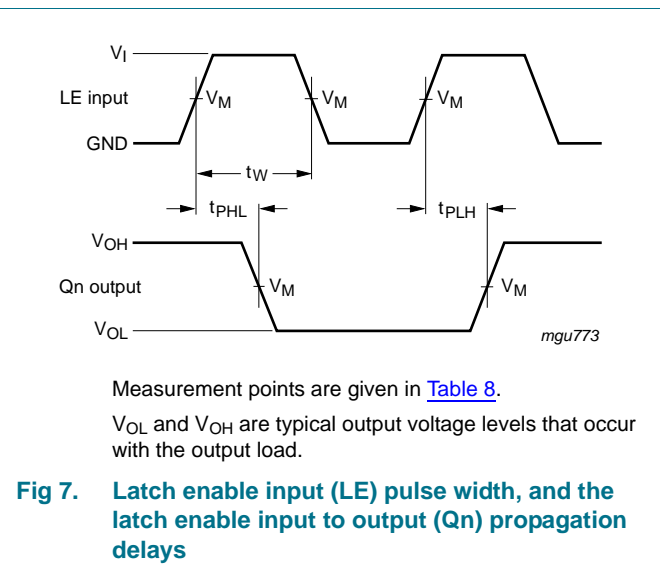
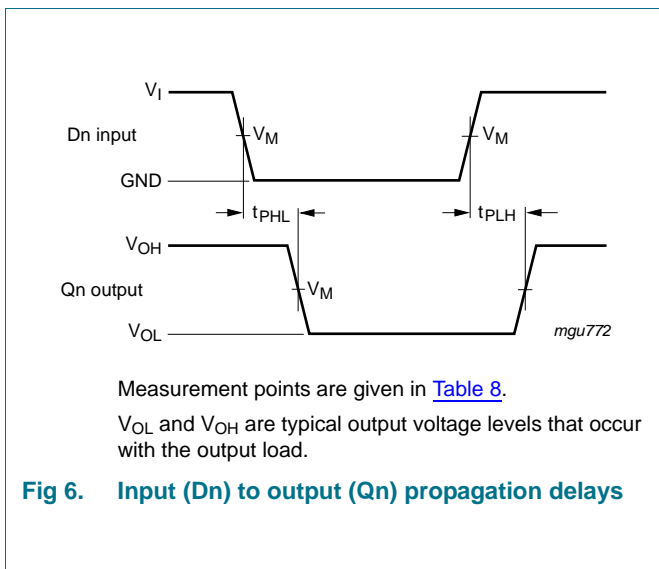
**Table 7. Dynamic characteristics ...continued**

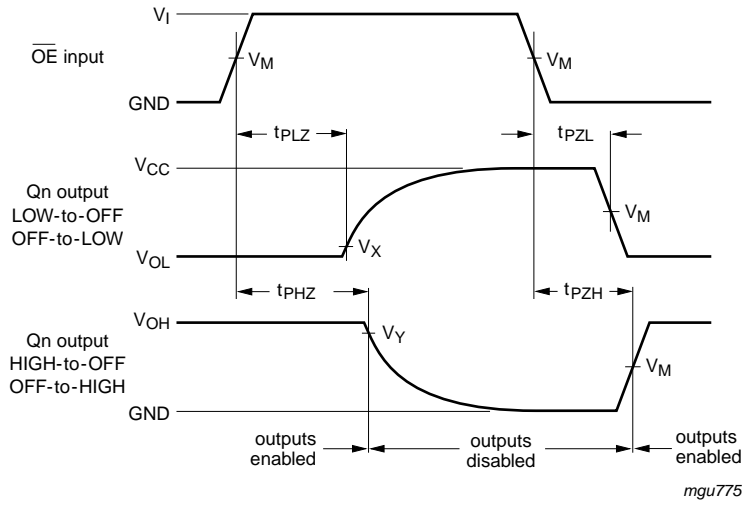
Voltages are referenced to GND (ground = 0 V). For test circuit see [Figure 10](#).

| Symbol             | Parameter                     | Conditions   | T <sub>amb</sub> = -40 °C to +85 °C |                    |     | -40 °C to +125 °C |     | Unit |    |
|--------------------|-------------------------------|--|-------------------------------------|--------------------|-----|-------------------|-----|------|----|
|                    |                               |  | Min                                 | Typ <sup>[1]</sup> | Max | Min               | Max |      |    |
| t <sub>h</sub>     | hold time                     | Dn to LE; see <a href="#">Figure 9</a>             |                                     |                    |     |                   |     |      |    |
|                    |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                 | 2.5                                 | -                  | -   | 2.5               | -   | ns   |    |
|                    |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                   | 2.0                                 | -                  | -   | 2.0               | -   | ns   |    |
|                    |                               | V <sub>CC</sub> = 2.7 V                            | 0.9                                 | -                  | -   | 0.9               | -   | ns   |    |
|                    |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                   | +0.9                                | -1.0               | -   | +0.9              | -   | ns   |    |
| t <sub>sk(o)</sub> | output skew time              | V <sub>CC</sub> = 3.0 V to 3.6 V                   | [3]                                 | -                  | -   | 1.0               | -   | 1.5  | ns |
| C <sub>PD</sub>    | power dissipation capacitance | per input; V <sub>I</sub> = GND to V <sub>CC</sub> | [4]                                 |                    |     |                   |     |      |    |
|                    |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                 | -                                   | 10.8               | -   | -                 | -   | pF   |    |
|                    |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                   | -                                   | 13.0               | -   | -                 | -   | pF   |    |
|                    |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                   | -                                   | 15.0               | -   | -                 | -   | pF   |    |

- [1] Typical values are measured at T<sub>amb</sub> = 25 °C and V<sub>CC</sub> = 1.2 V, 1.8 V, 2.5 V, 2.7 V and 3.3 V respectively.
- [2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.  
t<sub>en</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>.  
t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>.
- [3] Skew between any two outputs of the same package switching in the same direction. This parameter is guaranteed by design.
- [4] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).  
P<sub>D</sub> = C<sub>PD</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>i</sub> × N + Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) 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 Volts  
N = number of inputs switching  
Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of the outputs

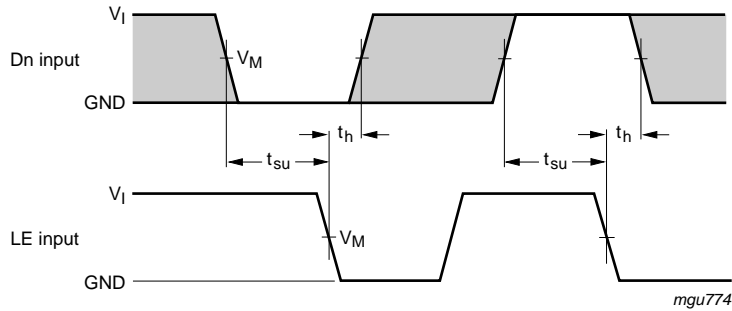
## 11. Waveforms





Measurement points are given in [Table 8](#).  
 $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

**Fig 8. 3-state enable and disable times**

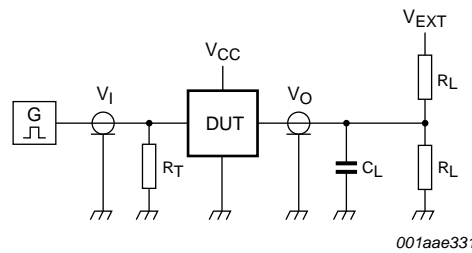
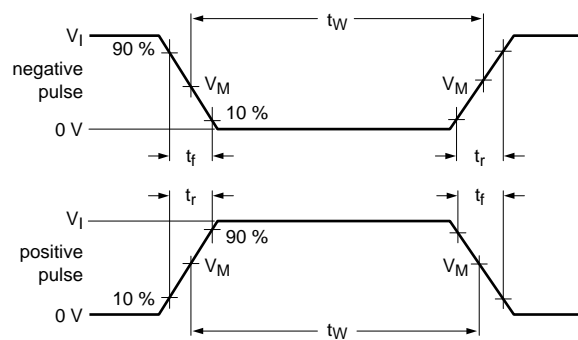


Measurement points are given in [Table 8](#).  
 $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.  
 The shaded areas indicate when the input is permitted to change for predictable output performance.

**Fig 9. Data set-up and hold times for the Dn input to the LE input**

**Table 8. Measurement points**

| Supply voltage   | Input           |                       | Output                |                          |                          |
|------------------|-----------------|-----------------------|-----------------------|--------------------------|--------------------------|
| V <sub>CC</sub>  | V <sub>I</sub>  | V <sub>M</sub>        | V <sub>M</sub>        | V <sub>X</sub>           | V <sub>Y</sub>           |
| 1.2 V            | V <sub>CC</sub> | 0.5 × V <sub>CC</sub> | 0.5 × V <sub>CC</sub> | V <sub>OL</sub> + 0.15 V | V <sub>OH</sub> - 0.15 V |
| 1.65 V to 1.95 V | V <sub>CC</sub> | 0.5 × V <sub>CC</sub> | 0.5 × V <sub>CC</sub> | V <sub>OL</sub> + 0.15 V | V <sub>OH</sub> - 0.15 V |
| 2.3 V to 2.7 V   | V <sub>CC</sub> | 0.5 × V <sub>CC</sub> | 0.5 × V <sub>CC</sub> | V <sub>OL</sub> + 0.15 V | V <sub>OH</sub> - 0.15 V |
| 2.7 V            | 2.7 V           | 1.5 V                 | 1.5 V                 | V <sub>OL</sub> + 0.3 V  | V <sub>OH</sub> - 0.3 V  |
| 3.0 V to 3.6 V   | 2.7 V           | 1.5 V                 | 1.5 V                 | V <sub>OL</sub> + 0.3 V  | V <sub>OH</sub> - 0.3 V  |



001aae331

Test data is given in [Table 9](#).

Definitions for test circuit:

R<sub>L</sub> = Load resistance.

C<sub>L</sub> = Load capacitance including jig and probe capacitance.

R<sub>T</sub> = Termination resistance should be equal to output impedance Z<sub>o</sub> of the pulse generator.

V<sub>EXT</sub> = External voltage for measuring switching times.

**Fig 10. Test circuit for measuring switching times**

**Table 9. Test data**

| Supply voltage   | Input           |                                 | Load           |                | V <sub>EXT</sub>                    |                                     |                                     |
|------------------|-----------------|---------------------------------|----------------|----------------|-------------------------------------|-------------------------------------|-------------------------------------|
|                  | V <sub>I</sub>  | t <sub>r</sub> , t <sub>f</sub> | C <sub>L</sub> | R <sub>L</sub> | t <sub>PLH</sub> , t <sub>PHL</sub> | t <sub>PLZ</sub> , t <sub>PZL</sub> | t <sub>PHZ</sub> , t <sub>PZH</sub> |
| 1.2 V            | V <sub>CC</sub> | ≤ 2 ns                          | 30 pF          | 1 kΩ           | open                                | 2 × V <sub>CC</sub>                 | GND                                 |
| 1.65 V to 1.95 V | V <sub>CC</sub> | ≤ 2 ns                          | 30 pF          | 1 kΩ           | open                                | 2 × V <sub>CC</sub>                 | GND                                 |
| 2.3 V to 2.7 V   | V <sub>CC</sub> | ≤ 2 ns                          | 30 pF          | 500 Ω          | open                                | 2 × V <sub>CC</sub>                 | GND                                 |
| 2.7 V            | 2.7 V           | ≤ 2.5 ns                        | 50 pF          | 500 Ω          | open                                | 2 × V <sub>CC</sub>                 | GND                                 |
| 3.0 V to 3.6 V   | 2.7 V           | ≤ 2.5 ns                        | 50 pF          | 500 Ω          | open                                | 2 × V <sub>CC</sub>                 | GND                                 |

## 12. Package outline

TSSOP48: plastic thin shrink small outline package; 48 leads; body width 6.1 mm

SOT362-1

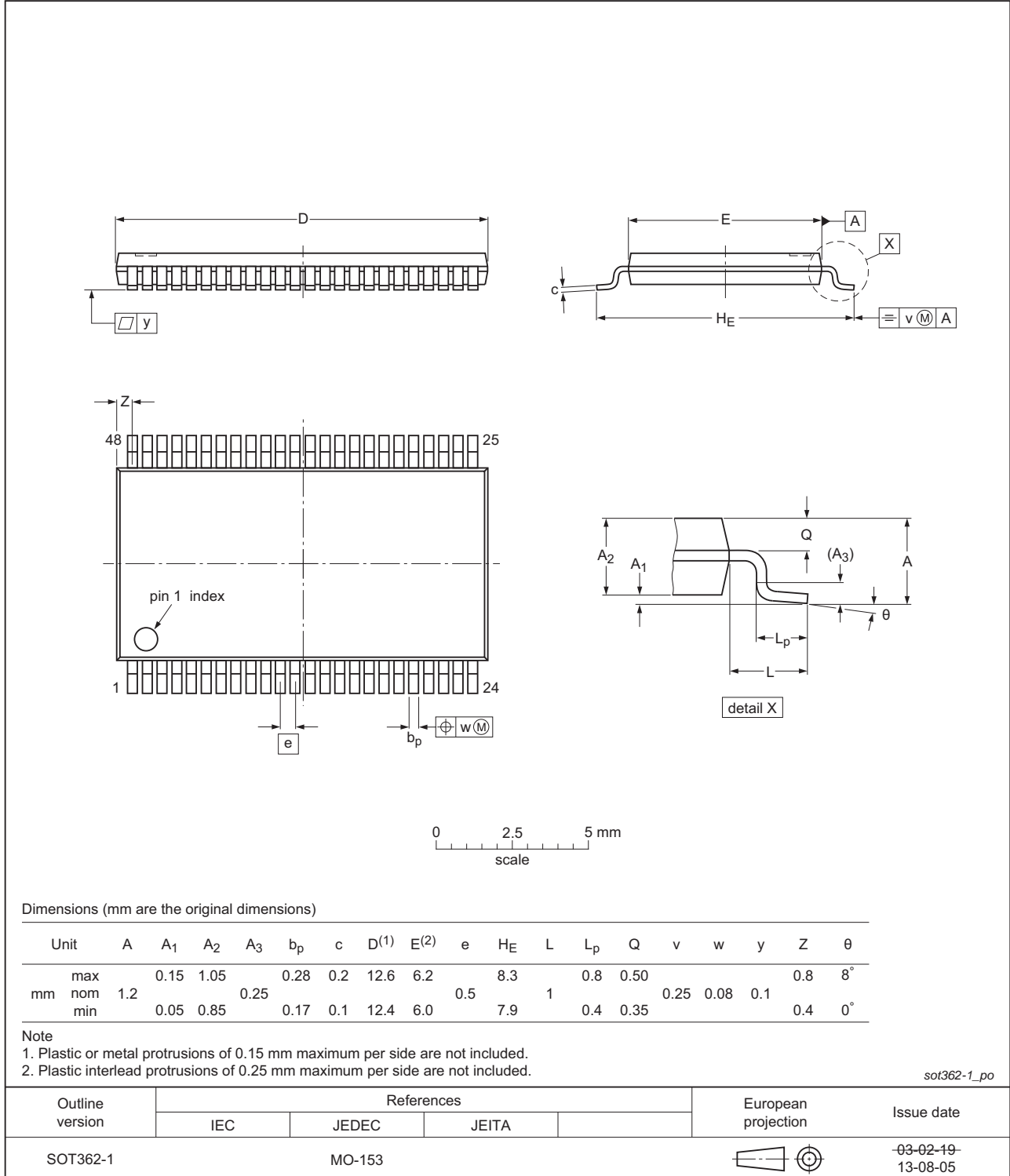


Fig 11. Package outline SOT362-1 (TSSOP-48)

SSOP48: plastic shrink small outline package; 48 leads; body width 7.5 mm

SOT370-1

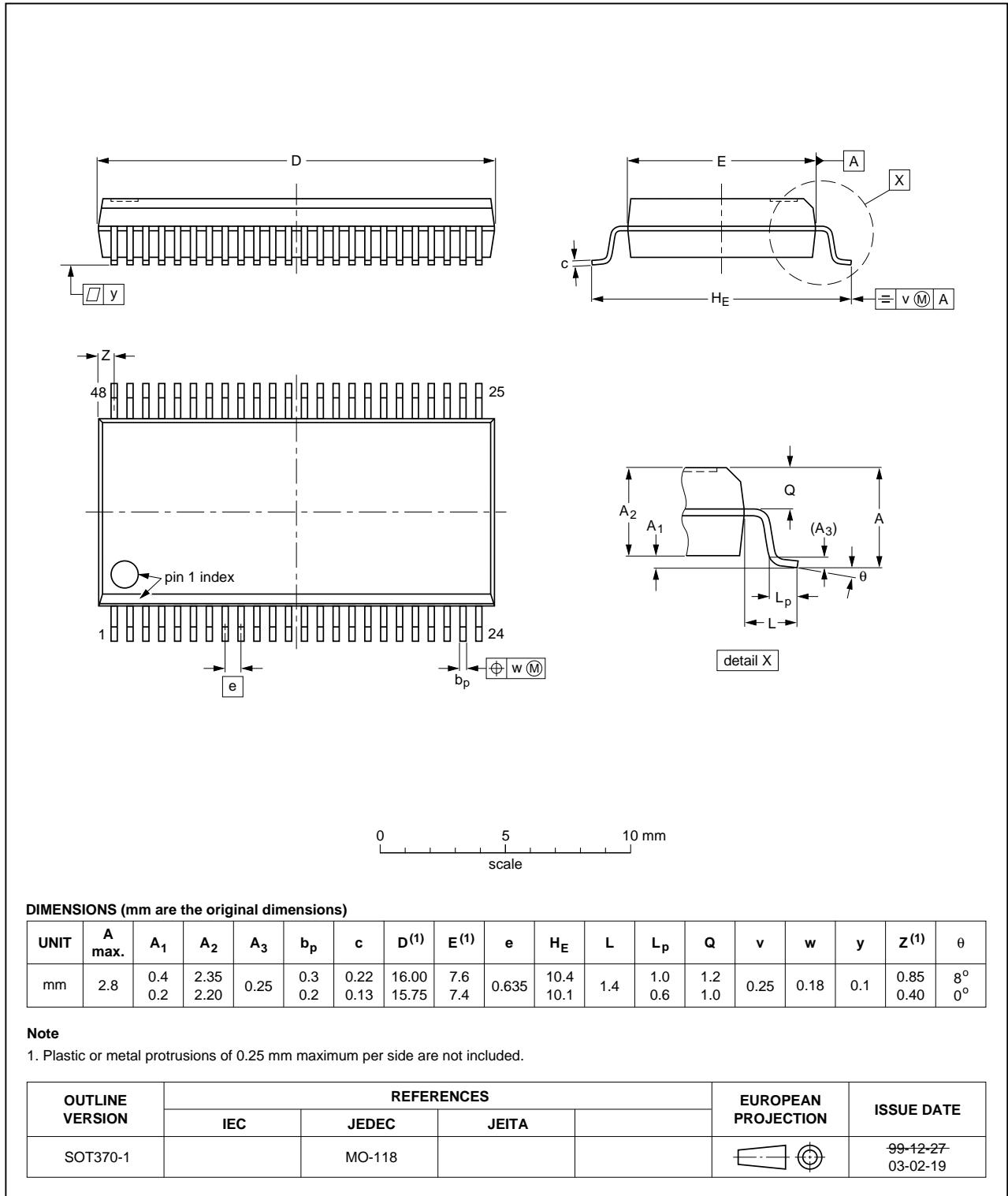


Fig 12. Package outline SOT370-1 (SSOP48)

## 13. Abbreviations

Table 10. Abbreviations

| Acronym | Description                 |
|---------|-----------------------------|
| CDM     | Charged Device Model        |
| DUT     | Device Under Test           |
| ESD     | ElectroStatic Discharge     |
| HBM     | Human Body Model            |
| MM      | Machine Model               |
| TTL     | Transistor-Transistor Logic |

## 14. Revision history

Table 11. Revision history

| Document ID                  | Release date  | Data sheet status     | Change notice | Supersedes                   |
|------------------------------|---|-----------------------|---------------|------------------------------|
| 74LVC_LVCH16373A v.8         | 20140106  | Product data sheet    | -             | 74LVC_LVCH16373A v.7         |
| Modifications:               | <ul style="list-style-type: none"> <li>General description corrected (errata).</li> </ul>   |                       |               |                              |
| 74LVC_LVCH16373A v.7         | 20130118  | Product data sheet    | -             | 74LVC_LVCH16373A v.6         |
| 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><a href="#">Table 5</a>, <a href="#">Table 6</a>, <a href="#">Table 7</a>, <a href="#">Table 8</a> and <a href="#">Table 9</a>: values added for lower voltage ranges.</li> </ul> |                       |               |                              |
| 74LVC_LVCH16373A v.6         | 20031208  | Product specification | -             | 74LVC_LVCH16373A v.5         |
| 74LVC_LVCH16373A v.5         | 20021002  | Product specification | -             | 74LVC_H16373A v.4            |
| 74LVC_H16373A v.4            | 19980317  | Product specification | -             | 74LVC16373A_74LVCH16373A v.3 |
| 74LVC16373A_74LVCH16373A v.3 | 19980317  | Product specification | -             | 74LVC16373A v.2              |
| 74LVC16373A v.2              | 19970822  | Product specification | -             | 74LVC16373A v.1              |
| 74LVC16373A v.1              | -   | -                     | -             | -                            |

## 15. Legal information

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| 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".

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