

# 74LVC4245A

Octal dual supply translating transceiver; 3-state

Rev. 10 — 18 December 2012

Product data sheet

## 1. General description

The 74LVC4245A is an octal dual supply translating transceiver featuring non-inverting 3-state bus compatible outputs in both send and receive directions. It is designed to interface between a 3 V and 5 V bus in a mixed 3 V and 5 V supply environment.

The device features an output enable input (pin  $\overline{\text{OE}}$ ) for easy cascading and a send/receive input (pin DIR) for direction control. Pin  $\overline{\text{OE}}$  controls the outputs so that the buses are effectively isolated.

In suspend mode, when  $V_{\text{CC(A)}}$  is zero, there will be no current flow from one supply to the other supply. The A-outputs must be set 3-state and the voltage on the A-bus must be smaller than  $V_{\text{diode}}$  (typical 0.7 V).

$V_{\text{CC(A)}} \geq V_{\text{CC(B)}}$ , except in suspend mode.

## 2. Features and benefits

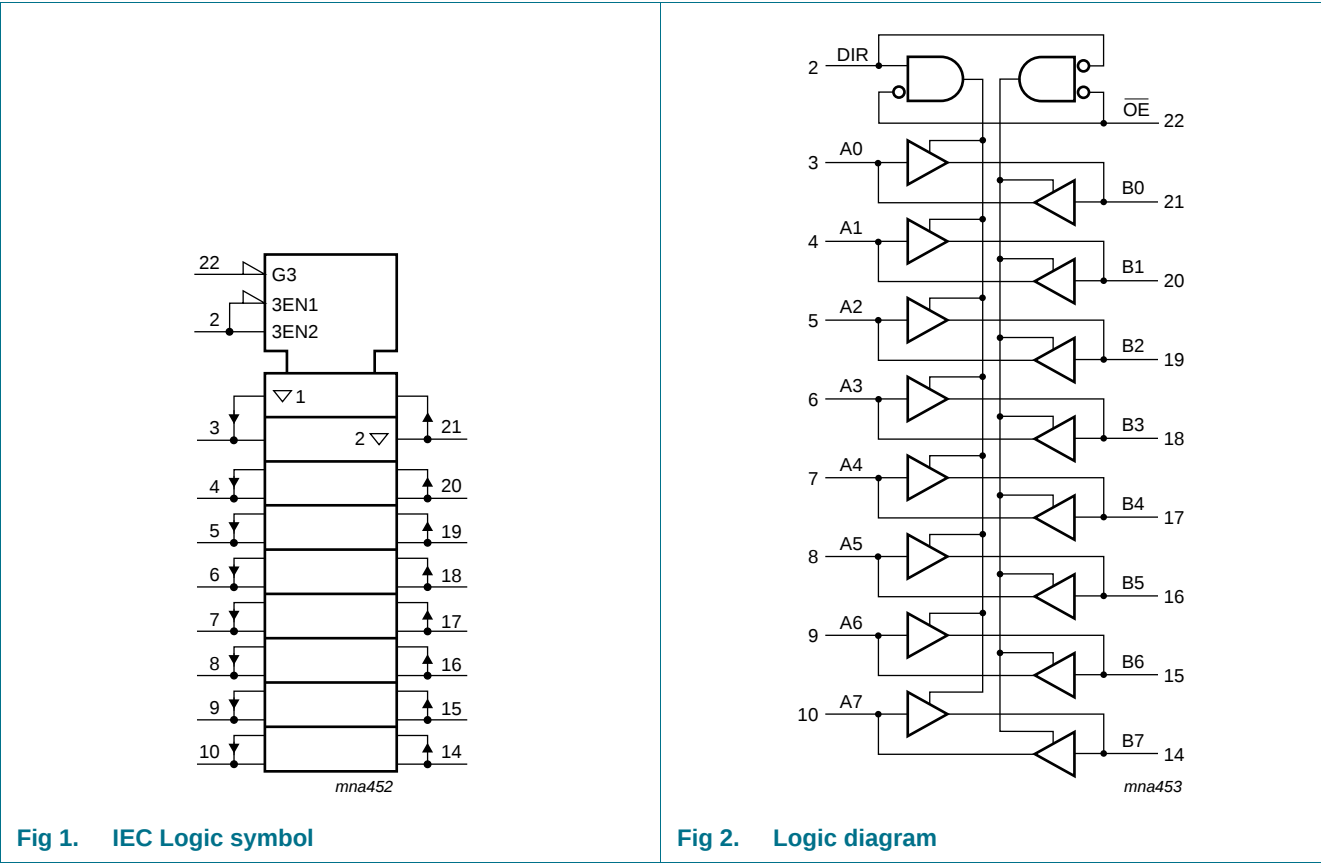
- 5 V tolerant inputs/outputs, for interfacing with 5 V logic
- Wide supply voltage range:
  - ◆ 3 V bus ( $V_{\text{CC(B)}}$ ): 1.5 V to 3.6 V
  - ◆ 5 V bus ( $V_{\text{CC(A)}}$ ): 1.5 V to 5.5 V
- CMOS low-power consumption
- Direct interface with TTL levels
- Inputs accept voltages up to 5.5 V
- High-impedance when  $V_{\text{CC(A)}} = 0$  V
- Complies with JEDEC standard no. JESD8B/JESD36
- ESD protection:
  - ◆ HBM JESD22-A114F exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
- Multiple package options
- Specified from  $-40$  °C to  $+85$  °C and  $-40$  °C to  $+125$  °C

3. Ordering information

Table 1. Ordering information

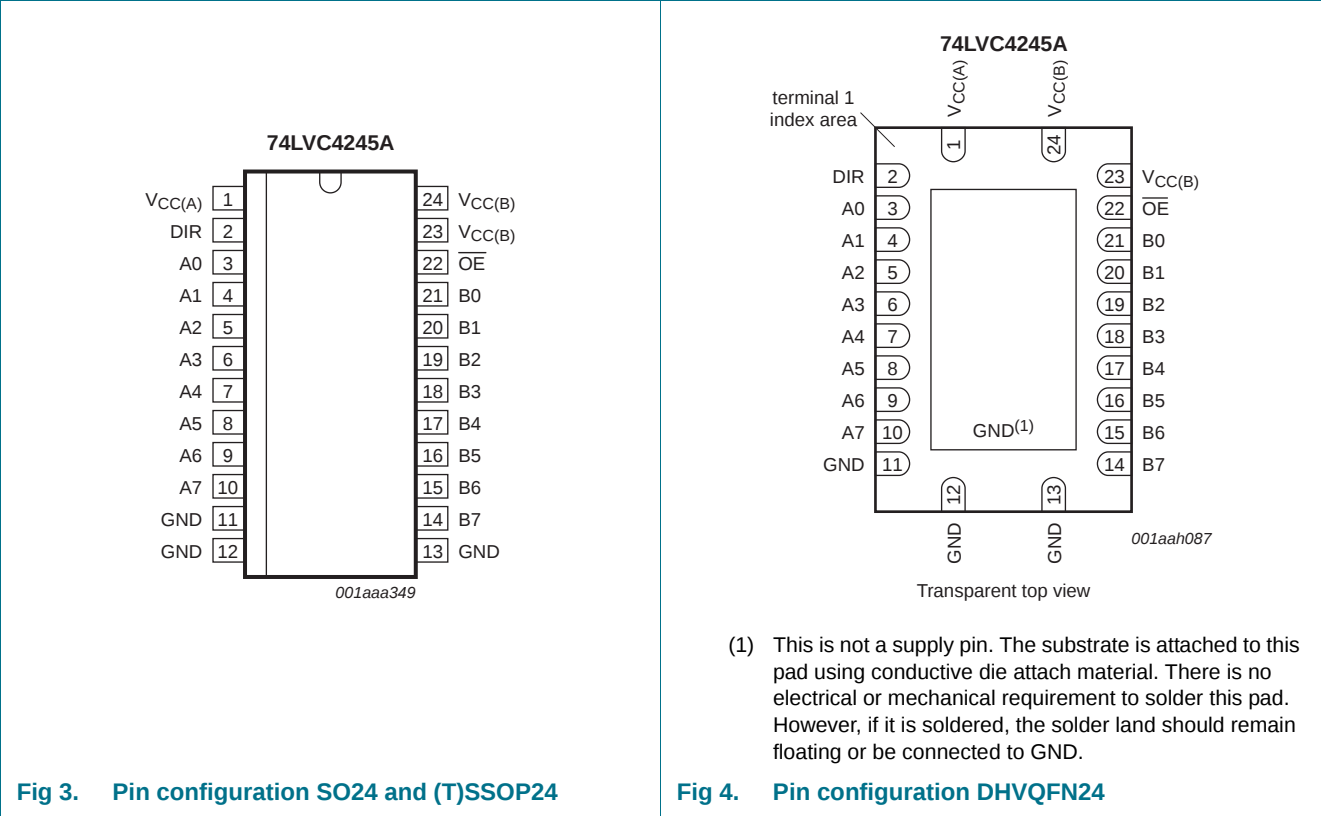
| Type number  | Package           |          |                                                                                                                                      |          |
|--------------|-------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------|----------|
|              | Temperature range | Name     | Description                                                                                                                          | Version  |
| 74LVC4245AD  | −40 °C to +125 °C | SO24     | plastic small outline package; 24 leads;<br>body width 7.5 mm                                                                        | SOT137-1 |
| 74LVC4245ADB | −40 °C to +125 °C | SSOP24   | plastic shrink small outline package; 24 leads;<br>body width 5.3 mm                                                                 | SOT340-1 |
| 74LVC4245APW | −40 °C to +125 °C | TSSOP24  | plastic thin shrink small outline package; 24 leads;<br>body width 4.4 mm                                                            | SOT355-1 |
| 74LVC4245ABQ | −40 °C to +125 °C | DHVQFN24 | plastic dual in-line compatible thermal enhanced<br>very thin quad flat package; no leads; 24 terminals;<br>body 3.5 × 5.5 × 0.85 mm | SOT815-1 |

4. Functional diagram



5. Pinning information

5.1 Pinning



5.2 Pin description

Table 2. Pin description

| Symbol             | Pin                            | Description                      |
|--------------------|--------------------------------|----------------------------------|
| V <sub>CC(A)</sub> | 1                              | supply voltage (5 V bus)         |
| V <sub>CC(B)</sub> | 23, 24                         | supply voltage (3 V bus)         |
| GND                | 11, 12, 13                     | ground (0 V)                     |
| DIR                | 2                              | direction control                |
| A[0:7]             | 3, 4, 5, 6, 7, 8, 9, 10        | data input or output             |
| B[0:7]             | 21, 20, 19, 18, 17, 16, 15, 14 | data input or output             |
| OE                 | 22                             | output enable input (active LOW) |

## 6. Functional description

**Table 3.** Functional table<sup>[1]</sup>

| Input |     | Input/output |       |
|-------|-----|--------------|-------|
| OE    | DIR | An           | Bn    |
| L     | L   | A = B        | input |
| L     | H   | input        | B = A |
| H     | X   | Z            | 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 |
|-------------|-------------------------|--------------------------------|---------------------|----------------|------|
| $V_{CC(A)}$ | supply voltage A        |                                | -0.5                | +6.5           | V    |
| $V_{CC(B)}$ | supply voltage B        |                                | -0.5                | +4.6           | V    |
| $I_{IK}$    | input clamping current  | $V_I < 0$ V                    | -50                 | -              | mA   |
| $V_I$       | input voltage           |                                | <sup>[1]</sup> -0.5 | +6.5           | V    |
| $I_{OK}$    | output clamping current | $V_O > V_{CCO}$ or $V_O < 0$ V | <sup>[3]</sup> -    | ±50            | mA   |
| $V_O$       | output voltage          | output HIGH or LOW state       | <sup>[1]</sup> -0.5 | $V_{CC} + 0.5$ | V    |
|             |                         | output 3-state                 | <sup>[1]</sup> -0.5 | +6.5           | V    |
| $I_O$       | output current          | $V_O = 0$ V to $V_{CCO}$       | <sup>[3]</sup> -    | ±50            | mA   |
| $I_{CC}$    | supply current          |                                | -                   | 100            | mA   |
| $I_{GND}$   | ground current          |                                | -100                | -              | mA   |
| $T_{stg}$   | storage temperature     |                                | -65                 | +150           | °C   |
| $P_{tot}$   | total power dissipation | $T_{amb} = -40$ °C to +125 °C  | <sup>[2]</sup> -    | 500            | mW   |

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For SO24 packages: above 70 °C the value of  $P_{tot}$  derates linearly with 8 mW/K.  
 For (T)SSOP24 packages: above 60 °C the value of  $P_{tot}$  derates linearly with 5.5 mW/K.  
 For DHVQFN24 packages: above 60 °C the value of  $P_{tot}$  derates linearly with 4.5 mW/K.

[3]  $V_{CCO}$  is the supply voltage associated with the output.

## 8. Recommended operating conditions

**Table 5.** Recommended operating conditions

| Symbol      | Parameter        | Conditions                                                                                 | Min | Typ | Max | Unit |
|-------------|------------------|--------------------------------------------------------------------------------------------|-----|-----|-----|------|
| $V_{CC(A)}$ | supply voltage A | $V_{CC(A)} \geq V_{CC(B)}$ ;<br>see <a href="#">Figure 5</a> for maximum speed performance | 1.5 | -   | 5.5 | V    |
| $V_{CC(B)}$ | supply voltage B | $V_{CC(A)} \geq V_{CC(B)}$ ;<br>see <a href="#">Figure 5</a> for low-voltage applications  | 1.5 | -   | 3.6 | V    |
| $V_I$       | input voltage    | for control inputs                                                                         | 0   | -   | 5.5 | V    |

Table 5. Recommended operating conditions ...continued

| Symbol              | Parameter                           | Conditions                                 | Min | Typ | Max      | Unit |
|---------------------|-------------------------------------|--------------------------------------------|-----|-----|----------|------|
| $V_O$               | output voltage                      | output HIGH or LOW state                   | 0   | -   | $V_{CC}$ | V    |
|                     |                                     | output 3-state                             | 0   | -   | 5.5      | V    |
| $T_{amb}$           | ambient temperature                 |                                            | -40 | -   | +125     | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC(B)} = 2.7\text{ V to }3.0\text{ V}$ | -   | -   | 20       | ns/V |
|                     |                                     | $V_{CC(B)} = 3.0\text{ V to }3.6\text{ V}$ | -   | -   | 10       | ns/V |
|                     |                                     | $V_{CC(A)} = 3.0\text{ V to }4.5\text{ V}$ | -   | -   | 20       | ns/V |
|                     |                                     | $V_{CC(A)} = 4.5\text{ V to }5.5\text{ V}$ | -   | -   | 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                                                                | Min               | Typ <sup>[1]</sup> | Max     | Unit          |
|--------------------------------------------|---------------------------|---------------------------------------------------------------------------|-------------------|--------------------|---------|---------------|
| $T_{amb} = -40\text{ °C to }+85\text{ °C}$ |                           |                                                                           |                   |                    |         |               |
| $V_{IH}$                                   | HIGH-level input voltage  | $V_{CC(B)} = 2.7\text{ V to }3.6\text{ V}$                                | 2.0               | -                  | -       | V             |
|                                            |                           | $V_{CC(A)} = 4.5\text{ V to }5.5\text{ V}$                                | 2.0               | -                  | -       | V             |
| $V_{IL}$                                   | LOW-level input voltage   | $V_{CC(B)} = 2.7\text{ V to }3.6\text{ V}$                                | -                 | -                  | 0.8     | V             |
|                                            |                           | $V_{CC(A)} = 4.5\text{ V to }5.5\text{ V}$                                | -                 | -                  | 0.8     | V             |
| $V_{OH}$                                   | HIGH-level output voltage | $V_I = V_{IH}\text{ or }V_{IL}$                                           |                   |                    |         |               |
|                                            |                           | $V_{CC(B)} = 2.7\text{ V to }3.6\text{ V}; I_O = -100\text{ }\mu\text{A}$ | $V_{CC(B)} - 0.2$ | $V_{CC(B)}$        | -       | V             |
|                                            |                           | $V_{CC(B)} = 2.7\text{ V}; I_O = -12\text{ mA}$                           | $V_{CC(B)} - 0.5$ | -                  | -       | V             |
|                                            |                           | $V_{CC(B)} = 3.0\text{ V}; I_O = -24\text{ mA}$                           | $V_{CC(B)} - 0.8$ | -                  | -       | V             |
|                                            |                           | $V_{CC(A)} = 4.5\text{ V to }5.5\text{ V}; I_O = -100\text{ }\mu\text{A}$ | $V_{CC(A)} - 0.2$ | $V_{CC(A)}$        | -       | V             |
|                                            |                           | $V_{CC(A)} = 4.5\text{ V}; I_O = -12\text{ mA}$                           | $V_{CC(A)} - 0.5$ | -                  | -       | V             |
|                                            |                           | $V_{CC(A)} = 4.5\text{ V}; I_O = -24\text{ mA}$                           | $V_{CC(A)} - 0.8$ | -                  | -       | V             |
| $V_{OL}$                                   | LOW-level output voltage  | $V_I = V_{IH}\text{ or }V_{IL}$                                           |                   |                    |         |               |
|                                            |                           | $V_{CC(B)} = 2.7\text{ V to }3.6\text{ V}; I_O = 100\text{ }\mu\text{A}$  | -                 | -                  | 0.20    | V             |
|                                            |                           | $V_{CC(B)} = 2.7\text{ V}; I_O = 12\text{ mA}$                            | -                 | -                  | 0.40    | V             |
|                                            |                           | $V_{CC(B)} = 3.0\text{ V}; I_O = 24\text{ mA}$                            | -                 | -                  | 0.55    | V             |
|                                            |                           | $V_{CC(A)} = 4.5\text{ V to }5.5\text{ V}; I_O = 100\text{ }\mu\text{A}$  | -                 | -                  | 0.20    | V             |
|                                            |                           | $V_{CC(A)} = 4.5\text{ V}; I_O = 12\text{ mA}$                            | -                 | -                  | 0.40    | V             |
|                                            |                           | $V_{CC(A)} = 4.5\text{ V}; I_O = 24\text{ mA}$                            | -                 | -                  | 0.55    | V             |
| $I_I$                                      | input leakage current     | $V_I = 5.5\text{ V or GND}$                                               | -                 | $\pm 0.1$          | $\pm 5$ | $\mu\text{A}$ |
| $I_{OZ}$                                   | OFF-state output current  | $V_I = V_{IH}\text{ or }V_{IL}$ <sup>[2]</sup>                            |                   |                    |         |               |
|                                            |                           | $V_{CC(B)} = 3.6\text{ V}; V_O = V_{CC(B)}\text{ or GND}$                 | -                 | $\pm 0.1$          | $\pm 5$ | $\mu\text{A}$ |
|                                            |                           | $V_{CC(A)} = 5.5\text{ V}; V_O = V_{CC(A)}\text{ or GND}$                 | -                 | $\pm 0.1$          | $\pm 5$ | $\mu\text{A}$ |
| $I_{CC}$                                   | supply current            | $I_O = 0\text{ A}$                                                        |                   |                    |         |               |
|                                            |                           | $V_{CC(B)} = 3.6\text{ V};$<br>other inputs at $V_{CC(B)}\text{ or GND}$  | -                 | 0.1                | 10      | $\mu\text{A}$ |
|                                            |                           | $V_{CC(A)} = 5.5\text{ V};$<br>other inputs at $V_{CC(A)}\text{ or GND}$  | -                 | 0.1                | 10      | $\mu\text{A}$ |

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

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

| Symbol                                                       | Parameter                 | Conditions                                                                                          | Min                | Typ <sup>[1]</sup> | Max      | Unit    |
|--------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------|--------------------|--------------------|----------|---------|
| $\Delta I_{CC}$                                              | additional supply current | per control pin; $I_O = 0$ A                                                                        | [3]                |                    |          |         |
|                                                              |                           | $V_{CC(B)} = 2.7$ V to $3.6$ V;<br>$V_I = V_{CC(B)} - 0.6$ V;<br>other inputs at $V_{CC(B)}$ or GND | -                  | 5                  | 500      | $\mu$ A |
|                                                              |                           | $V_{CC(A)} = 4.5$ V to $5.5$ V;<br>$V_I = V_{CC(A)} - 0.6$ V;<br>other inputs at $V_{CC(A)}$ or GND | -                  | 5                  | 500      | $\mu$ A |
| $C_I$                                                        | input capacitance         |                                                                                                     | -                  | 4.0                | -        | pF      |
| $C_{I/O}$                                                    | input/output capacitance  | An and Bn                                                                                           | -                  | 5.0                | -        | pF      |
| <b><math>T_{amb} = -40</math> °C to <math>+125</math> °C</b> |                           |                                                                                                     |                    |                    |          |         |
| $V_{IH}$                                                     | HIGH-level input voltage  | $V_{CC(B)} = 2.7$ V to $3.6$ V                                                                      | 2.0                | -                  | -        | V       |
|                                                              |                           | $V_{CC(A)} = 4.5$ V to $5.5$ V                                                                      | 2.0                | -                  | -        | V       |
| $V_{IL}$                                                     | LOW-level input voltage   | $V_{CC(B)} = 2.7$ V to $3.6$ V                                                                      | -                  | -                  | 0.8      | V       |
|                                                              |                           | $V_{CC(A)} = 4.5$ V to $5.5$ V                                                                      | -                  | -                  | 0.8      | V       |
| $V_{OH}$                                                     | HIGH-level output voltage | $V_I = V_{IH}$ or $V_{IL}$                                                                          |                    |                    |          |         |
|                                                              |                           | $V_{CC(B)} = 2.7$ V to $3.6$ V; $I_O = -100$ $\mu$ A                                                | $V_{CC(B)} - 0.3$  | -                  | -        | V       |
|                                                              |                           | $V_{CC(B)} = 2.7$ V; $I_O = -12$ mA                                                                 | $V_{CC(B)} - 0.65$ | -                  | -        | V       |
|                                                              |                           | $V_{CC(B)} = 3.0$ V; $I_O = -24$ mA                                                                 | $V_{CC(B)} - 1.0$  | -                  | -        | V       |
|                                                              |                           | $V_{CC(A)} = 4.5$ V to $5.5$ V; $I_O = -100$ $\mu$ A                                                | $V_{CC(A)} - 0.3$  | -                  | -        | V       |
|                                                              |                           | $V_{CC(A)} = 4.5$ V; $I_O = -12$ mA                                                                 | $V_{CC(A)} - 0.65$ | -                  | -        | V       |
|                                                              |                           | $V_{CC(A)} = 4.5$ V; $I_O = -24$ mA                                                                 | $V_{CC(A)} - 1.0$  | -                  | -        | V       |
| $V_{OL}$                                                     | LOW-level output voltage  | $V_I = V_{IH}$ or $V_{IL}$                                                                          |                    |                    |          |         |
|                                                              |                           | $V_{CC(B)} = 2.7$ V to $3.6$ V; $I_O = 100$ $\mu$ A                                                 | -                  | -                  | 0.30     | V       |
|                                                              |                           | $V_{CC(B)} = 2.7$ V; $I_O = 12$ mA                                                                  | -                  | -                  | 0.60     | V       |
|                                                              |                           | $V_{CC(B)} = 3.0$ V; $I_O = 24$ mA                                                                  | -                  | -                  | 0.80     | V       |
|                                                              |                           | $V_{CC(A)} = 4.5$ V to $5.5$ V; $I_O = 100$ $\mu$ A                                                 | -                  | -                  | 0.30     | V       |
|                                                              |                           | $V_{CC(A)} = 4.5$ V; $I_O = 12$ mA                                                                  | -                  | -                  | 0.60     | V       |
|                                                              |                           | $V_{CC(A)} = 4.5$ V; $I_O = 24$ mA                                                                  | -                  | -                  | 0.80     | V       |
| $I_I$                                                        | input leakage current     | $V_I = 5.5$ V or GND                                                                                | -                  | -                  | $\pm 20$ | $\mu$ A |
| $I_{OZ}$                                                     | OFF-state output current  | $V_I = V_{IH}$ or $V_{IL}$                                                                          | [2]                |                    |          |         |
|                                                              |                           | $V_{CC(B)} = 3.6$ V; $V_O = V_{CC(B)}$ or GND                                                       | -                  | -                  | $\pm 20$ | $\mu$ A |
|                                                              |                           | $V_{CC(A)} = 5.5$ V; $V_O = V_{CC(A)}$ or GND                                                       | -                  | -                  | $\pm 20$ | $\mu$ A |
| $I_{CC}$                                                     | supply current            | $I_O = 0$ A                                                                                         |                    |                    |          |         |
|                                                              |                           | $V_{CC(B)} = 3.6$ V;<br>other inputs at $V_{CC(B)}$ or GND                                          | -                  | -                  | 40       | $\mu$ A |
|                                                              |                           | $V_{CC(A)} = 5.5$ V;<br>other inputs at $V_{CC(A)}$ or GND                                          | -                  | -                  | 40       | $\mu$ A |

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

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

| Symbol          | Parameter                 | Conditions                                                                                          | Min | Typ <sup>[1]</sup> | Max  | Unit    |
|-----------------|---------------------------|-----------------------------------------------------------------------------------------------------|-----|--------------------|------|---------|
| $\Delta I_{CC}$ | additional supply current | per control pin; $I_O = 0$ A                                                                        | [3] |                    |      |         |
|                 |                           | $V_{CC(B)} = 2.7$ V to $3.6$ V;<br>$V_I = V_{CC(B)} - 0.6$ V;<br>other inputs at $V_{CC(B)}$ or GND | -   | -                  | 5000 | $\mu$ A |
|                 |                           | $V_{CC(A)} = 4.5$ V to $5.5$ V;<br>$V_I = V_{CC(A)} - 0.6$ V;<br>other inputs at $V_{CC(A)}$ or GND | -   | -                  | 5000 | $\mu$ A |

[1] All typical values are measured at  $V_{CC(A)} = 5.0$  V,  $V_{CC(B)} = 3.3$  V and  $T_{amb} = 25$  °C.[2] For transceivers, the parameter  $I_{OZ}$  includes the input leakage current.[3]  $V_{CC(B)} = 2.7$  V to  $3.6$  V: other inputs at  $V_{CC(B)}$  or GND.  
 $V_{CC(A)} = 4.5$  V to  $5.5$  V: other inputs at  $V_{CC(A)}$  or GND.

## 10. Dynamic characteristics

**Table 7.** Dynamic characteristicsVoltages are referenced to GND (ground = 0 V).  $V_{CC(A)} = 4.5$  V to  $5.5$  V;  $t_r = t_f \leq 2.5$  ns. For test circuit see [Figure 8](#).

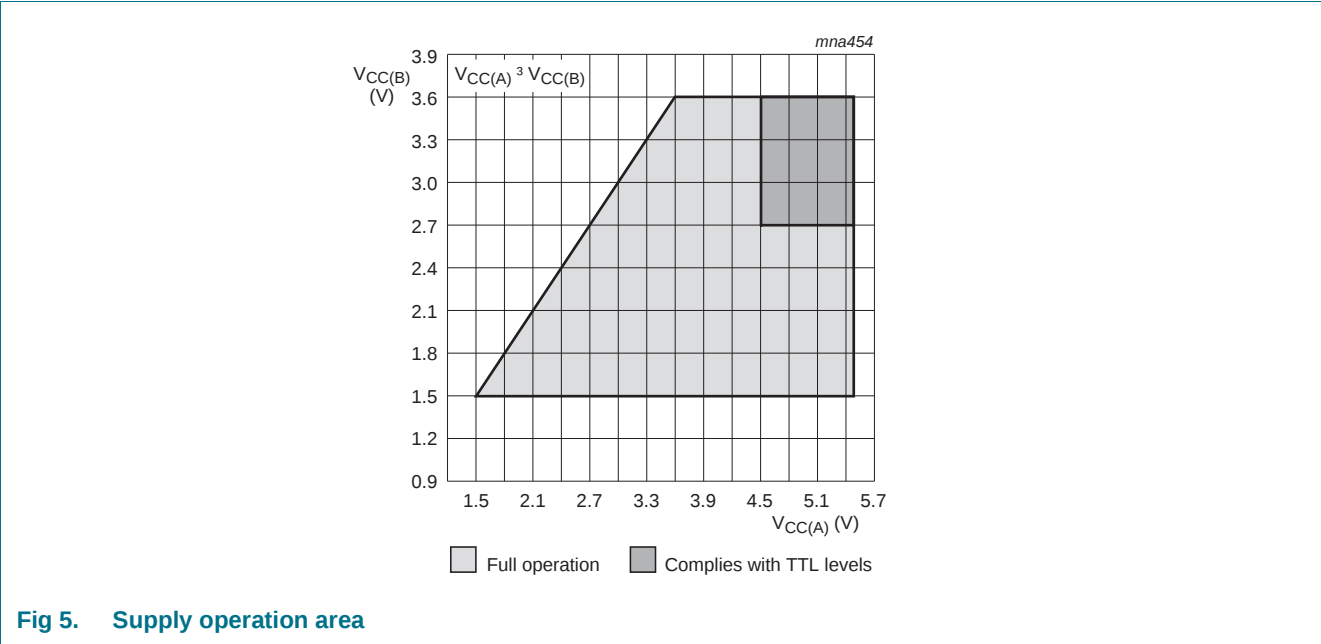
| Symbol    | Parameter                           | Conditions                                             | $V_{CC(B)}$    | -40 °C to +85 °C |                    |     | -40 °C to +125 °C |      | Unit |
|-----------|-------------------------------------|--------------------------------------------------------|----------------|------------------|--------------------|-----|-------------------|------|------|
|           |                                     |                                                        |                | Min              | Typ <sup>[1]</sup> | Max | Min               | Max  |      |
| $t_{PHL}$ | HIGH to LOW propagation delay       | An to Bn;<br>see <a href="#">Figure 6</a>              | 2.7 V          | 1.0              | 3.6                | 6.3 | 1.0               | 8.0  | ns   |
|           |                                     |                                                        | 3.0 V to 3.6 V | 1.0              | 3.3                | 6.3 | 1.0               | 8.0  | ns   |
|           |                                     | Bn to An;<br>see <a href="#">Figure 6</a>              | 2.7 V          | 1.0              | 3.4                | 6.1 | 1.0               | 8.0  | ns   |
|           |                                     |                                                        | 3.0 V to 3.6 V | 1.0              | 3.4                | 6.1 | 1.0               | 8.0  | ns   |
| $t_{PLH}$ | LOW to HIGH propagation delay       | An to Bn;<br>see <a href="#">Figure 6</a>              | 2.7 V          | 1.0              | 3.3                | 6.7 | 1.0               | 8.5  | ns   |
|           |                                     |                                                        | 3.0 V to 3.6 V | 1.0              | 2.8                | 6.5 | 1.0               | 8.5  | ns   |
|           |                                     | Bn to An;<br>see <a href="#">Figure 6</a>              | 2.7 V          | 1.0              | 3.0                | 5.0 | 1.0               | 6.5  | ns   |
|           |                                     |                                                        | 3.0 V to 3.6 V | 1.0              | 3.0                | 5.0 | 1.0               | 6.5  | ns   |
| $t_{PZL}$ | OFF-state to LOW propagation delay  | $\overline{OE}$ to An;<br>see <a href="#">Figure 7</a> | 2.7 V          | 1.0              | 4.5                | 9.0 | 1.0               | 11.5 | ns   |
|           |                                     |                                                        | 3.0 V to 3.6 V | 1.0              | 4.5                | 9.0 | 1.0               | 11.5 | ns   |
|           |                                     | $\overline{OE}$ to Bn;<br>see <a href="#">Figure 7</a> | 2.7 V          | 1.0              | 4.4                | 8.7 | 1.0               | 11.0 | ns   |
|           |                                     |                                                        | 3.0 V to 3.6 V | 1.0              | 3.8                | 8.1 | 1.0               | 10.5 | ns   |
| $t_{PZH}$ | OFF-state to HIGH propagation delay | $\overline{OE}$ to An;<br>see <a href="#">Figure 7</a> | 2.7 V          | 1.0              | 4.5                | 8.1 | 1.0               | 10.5 | ns   |
|           |                                     |                                                        | 3.0 V to 3.6 V | 1.0              | 4.5                | 8.1 | 1.0               | 10.5 | ns   |
|           |                                     | $\overline{OE}$ to Bn;<br>see <a href="#">Figure 7</a> | 2.7 V          | 1.0              | 4.3                | 8.7 | 1.0               | 11.0 | ns   |
|           |                                     |                                                        | 3.0 V to 3.6 V | 1.0              | 3.2                | 8.1 | 1.0               | 10.5 | ns   |
| $t_{PLZ}$ | LOW to OFF-state propagation delay  | $\overline{OE}$ to An;<br>see <a href="#">Figure 7</a> | 2.7 V          | 1.0              | 2.9                | 7.0 | 1.0               | 9.0  | ns   |
|           |                                     |                                                        | 3.0 V to 3.6 V | 1.0              | 2.9                | 7.0 | 1.0               | 9.0  | ns   |
|           |                                     | $\overline{OE}$ to Bn;<br>see <a href="#">Figure 7</a> | 2.7 V          | 1.0              | 3.9                | 7.7 | 1.0               | 10.0 | ns   |
|           |                                     |                                                        | 3.0 V to 3.6 V | 1.0              | 3.5                | 7.7 | 1.0               | 10.0 | ns   |
| $t_{PHZ}$ | HIGH to OFF-state propagation delay | $\overline{OE}$ to An;<br>see <a href="#">Figure 7</a> | 2.7 V          | 1.0              | 2.8                | 5.8 | 1.0               | 7.5  | ns   |
|           |                                     |                                                        | 3.0 V to 3.6 V | 1.0              | 2.8                | 5.8 | 1.0               | 7.5  | ns   |
|           |                                     | $\overline{OE}$ to Bn;<br>see <a href="#">Figure 7</a> | 2.7 V          | 1.0              | 3.3                | 7.8 | 1.0               | 10.0 | ns   |
|           |                                     |                                                        | 3.0 V to 3.6 V | 1.0              | 2.9                | 7.8 | 1.0               | 10.0 | ns   |

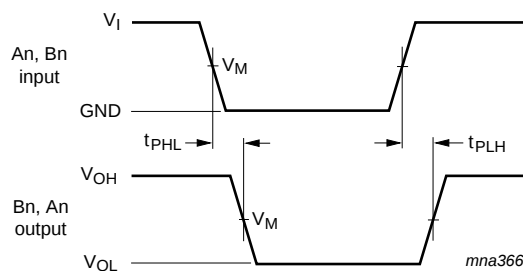
**Table 7. Dynamic characteristics ...continued**  
Voltages are referenced to GND (ground = 0 V).  $V_{CC(A)} = 4.5\text{ V to }5.5\text{ V}$ ;  $t_r = t_f \leq 2.5\text{ ns}$ . For test circuit see [Figure 8](#).

| Symbol      | Parameter                     | Conditions                                                                             | $V_{CC(B)}$         | −40 °C to +85 °C |                    |     | −40 °C to +125 °C |     | Unit |
|-------------|-------------------------------|----------------------------------------------------------------------------------------|---------------------|------------------|--------------------|-----|-------------------|-----|------|
|             |                               |                                                                                        |                     | Min              | Typ <sup>[1]</sup> | Max | Min               | Max |      |
| $t_{sk(o)}$ | output skew time              |                                                                                        | <a href="#">[2]</a> | -                | -                  | 1.0 | -                 | 1.5 | ns   |
| $C_{PD}$    | power dissipation capacitance | 5 V bus: Bn to An;<br>$V_I = \text{GND to } V_{CC(A)}$ ;<br>$V_{CC(A)} = 5.0\text{ V}$ | <a href="#">[3]</a> |                  |                    |     |                   |     |      |
|             |                               | outputs enabled                                                                        | -                   | -                | 17                 | -   | -                 | -   | pF   |
|             |                               | outputs disabled                                                                       | -                   | -                | 5                  | -   | -                 | -   | pF   |
|             |                               | 3 V bus: An to Bn;<br>$V_I = \text{GND to } V_{CC(B)}$ ;<br>$V_{CC(B)} = 3.3\text{ V}$ | <a href="#">[3]</a> |                  |                    |     |                   |     |      |
|             |                               | outputs enabled                                                                        | -                   | -                | 17                 | -   | -                 | -   | pF   |
|             |                               | outputs disabled                                                                       | -                   | -                | 5                  | -   | -                 | -   | pF   |

- [1] Typical values are measured at  $T_{amb} = 25\text{ °C}$ ,  $V_{CC(A)} = 5.0\text{ V}$ , and  $V_{CC(B)} = 2.7\text{ V}$  and  $3.3\text{ V}$  respectively.
- [2] Skew between any two outputs of the same package switching in the same direction. This parameter is guaranteed by design.
- [3]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$  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 Volts  
 $N$  = number of inputs switching  
 $\Sigma(C_L \times V_{CC}^2 \times f_o)$  = sum of the outputs

11. AC waveforms



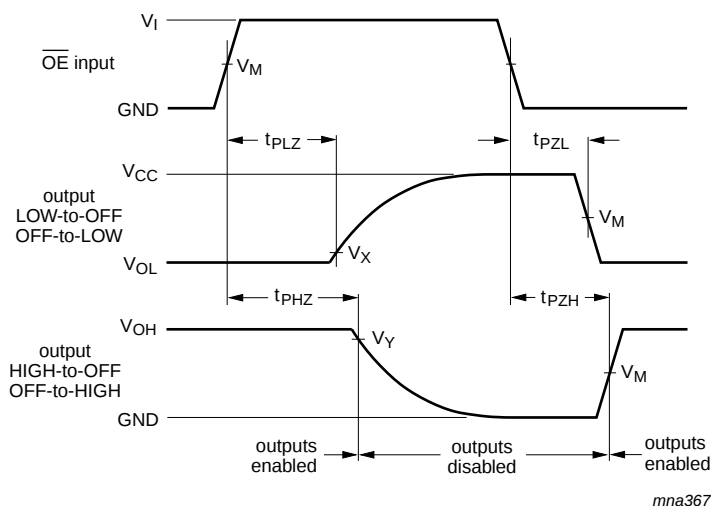


$V_M = 1.5 \text{ V}$  at  $2.7 \text{ V} \leq V_{CC(B)} \leq 3.6 \text{ V}$ ;

$V_M = 0.5 V_{CC(A)}$  at  $V_{CC(A)} \geq 4.5 \text{ V}$ .

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

**Fig 6. Input (An, Bn) to output (Bn, An) propagation delays**



$V_M = 1.5 \text{ V}$  at  $2.7 \text{ V} \leq V_{CC(B)} \leq 3.6 \text{ V}$ ;

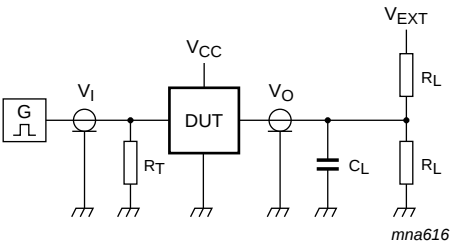
$V_M = 0.5 V_{CC(A)}$  at  $V_{CC(A)} \geq 4.5 \text{ V}$ .

$V_X = V_{OL} + 0.3 \text{ V}$  at  $V_{CC(B)} \geq 2.7 \text{ V}$ ;

$V_Y = V_{OH} - 0.3 \text{ V}$  at  $V_{CC(B)} \geq 2.7 \text{ V}$ .

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

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



Test data is given in [Table 8](#). Definitions for test circuit:  
 $R_L$  = Load resistance.  
 $C_L$  = Load capacitance including jig and probe capacitance.  
 $R_T$  = Termination resistance should be equal to output impedance  $Z_o$  of the pulse generator.

Fig 8. Load circuitry for switching times

Table 8. Test data

| Supply voltage |                | Input     | Load  |              | $V_{EXT}$          |                    |                        |
|----------------|----------------|-----------|-------|--------------|--------------------|--------------------|------------------------|
| $V_{CC(A)}$    | $V_{CC(B)}$    | $V_I$ [1] | $C_L$ | $R_L$        | $t_{PLH}, t_{PHL}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ [2] |
| < 2.7 V        | < 2.7 V        | $V_{CCI}$ | 50 pF | 500 $\Omega$ | open               | GND                | $2 \times V_{CCO}$     |
| -              | 2.7 V to 3.6 V | 2.7 V     | 50 pF | 500 $\Omega$ | open               | GND                | $2 \times V_{CCO}$     |
| 4.5 V to 5.5 V | -              | 3.0 V     | 50 pF | 500 $\Omega$ | open               | GND                | $2 \times V_{CCO}$     |

[1]  $V_{CCI}$  is the supply voltage associated with the data input port.  
[2]  $V_{CCO}$  is the supply voltage associated with the output port.

12. Package outline

SO24: plastic small outline package; 24 leads; body width 7.5 mm

SOT137-1

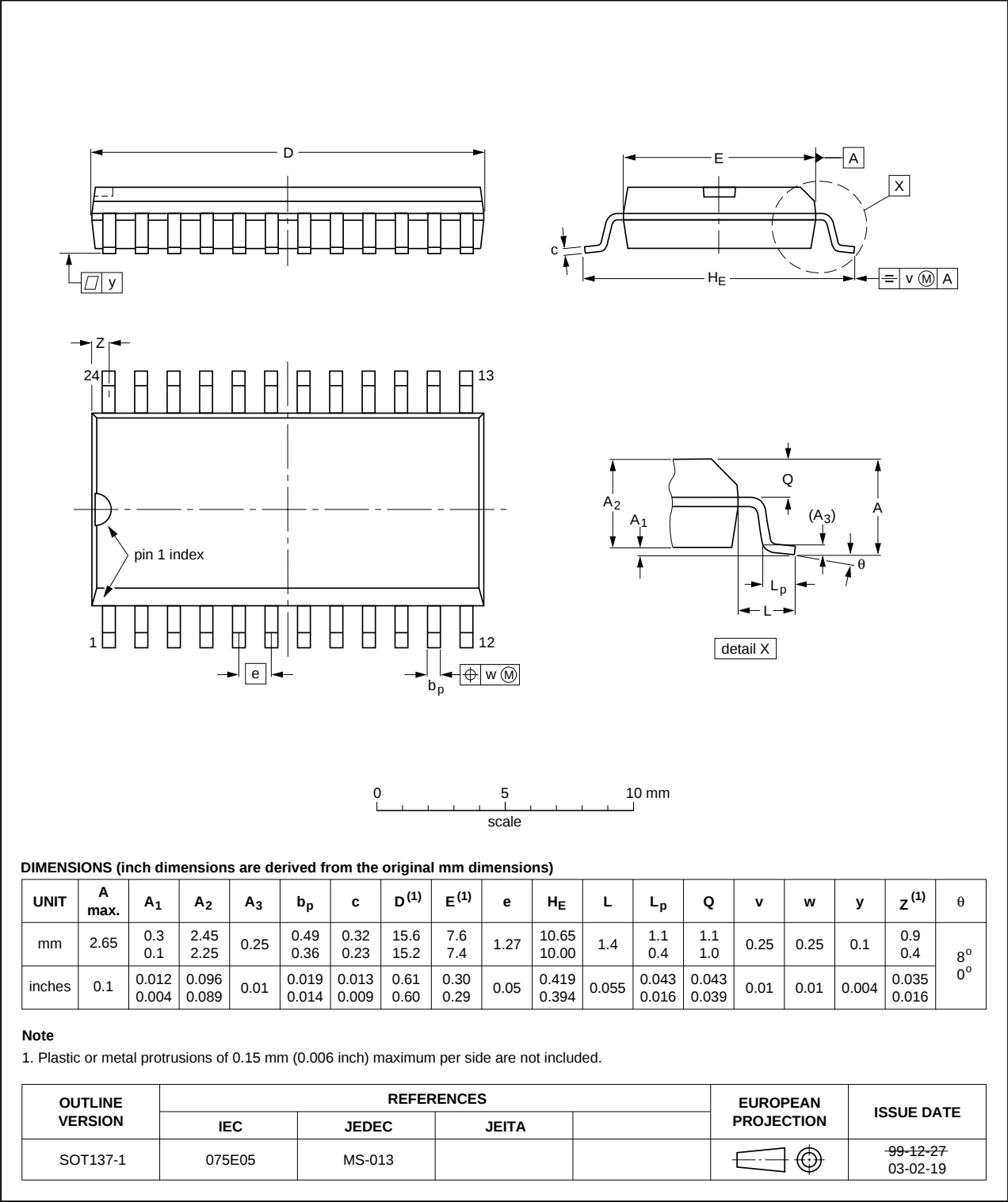


Fig 9. Package outline SOT137-1 (SO24)

SSOP24: plastic shrink small outline package; 24 leads; body width 5.3 mm

SOT340-1

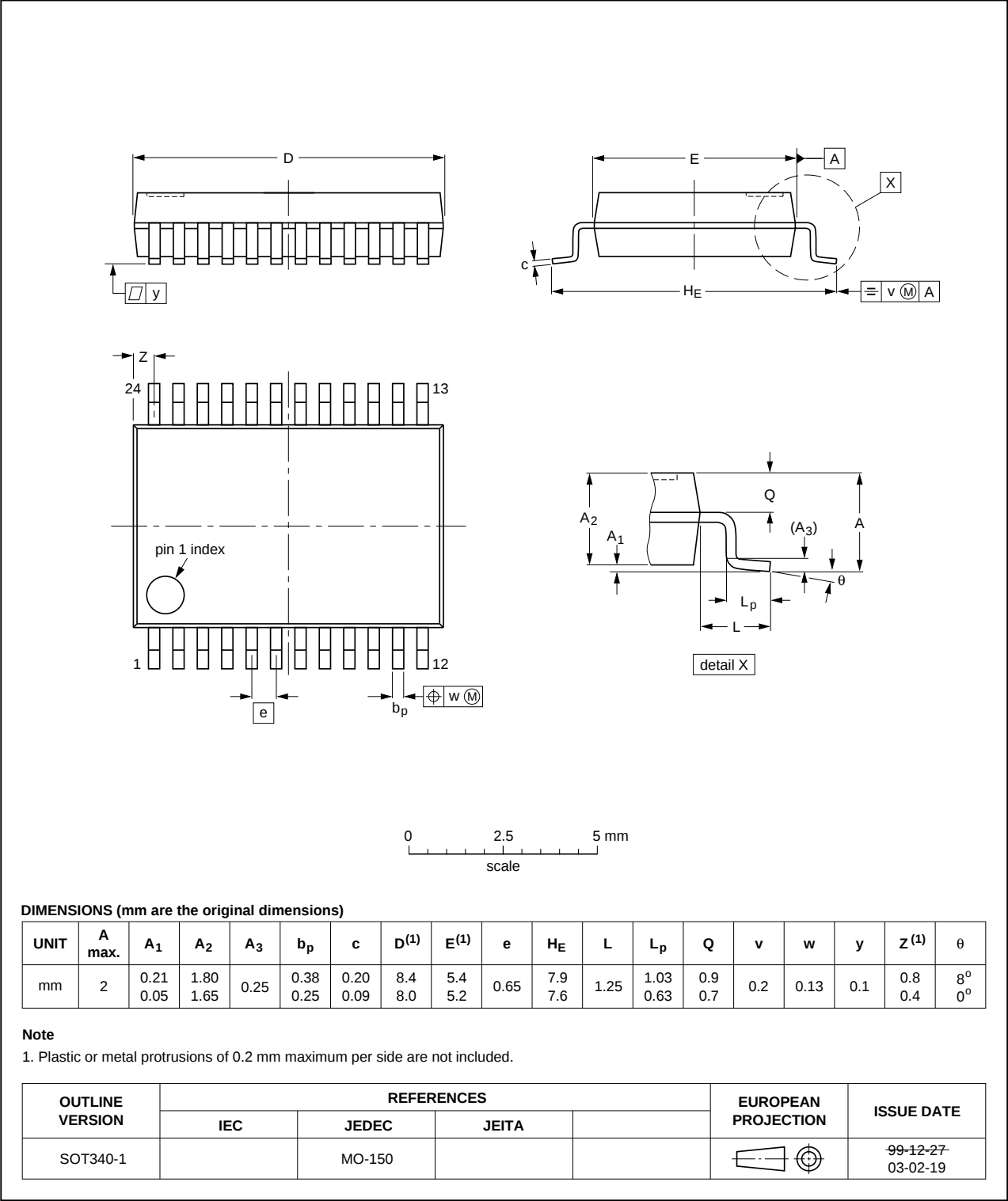


Fig 10. Package outline SOT340-1 (SSOP24)

TSSOP24: plastic thin shrink small outline package; 24 leads; body width 4.4 mm

SOT355-1

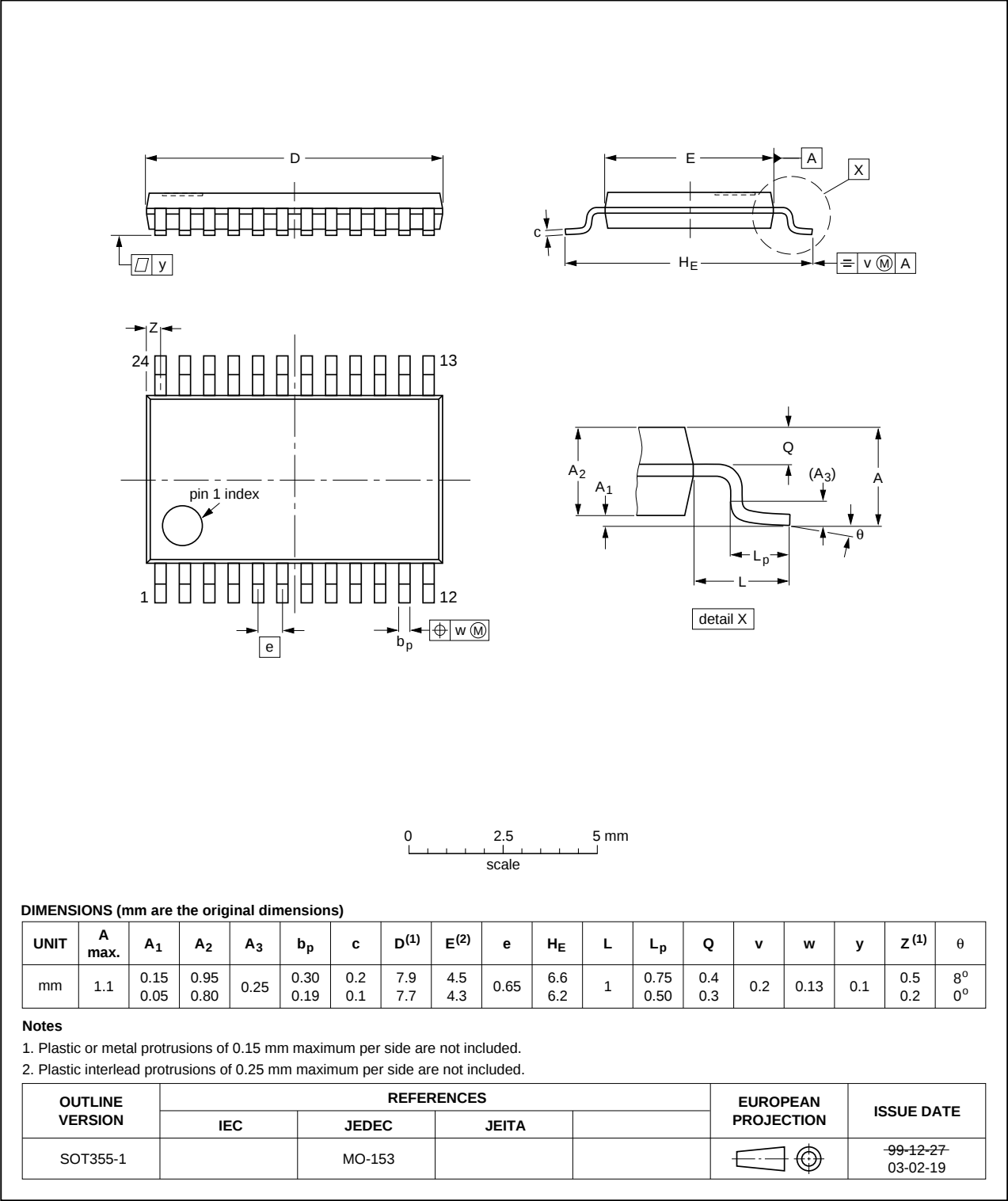


Fig 11. Package outline SOT355-1 (TSSOP24)

DHVQFN24: plastic dual in-line compatible thermal enhanced very thin quad flat package;  
no leads; 24 terminals; body 3.5 x 5.5 x 0.85 mm

SOT815-1

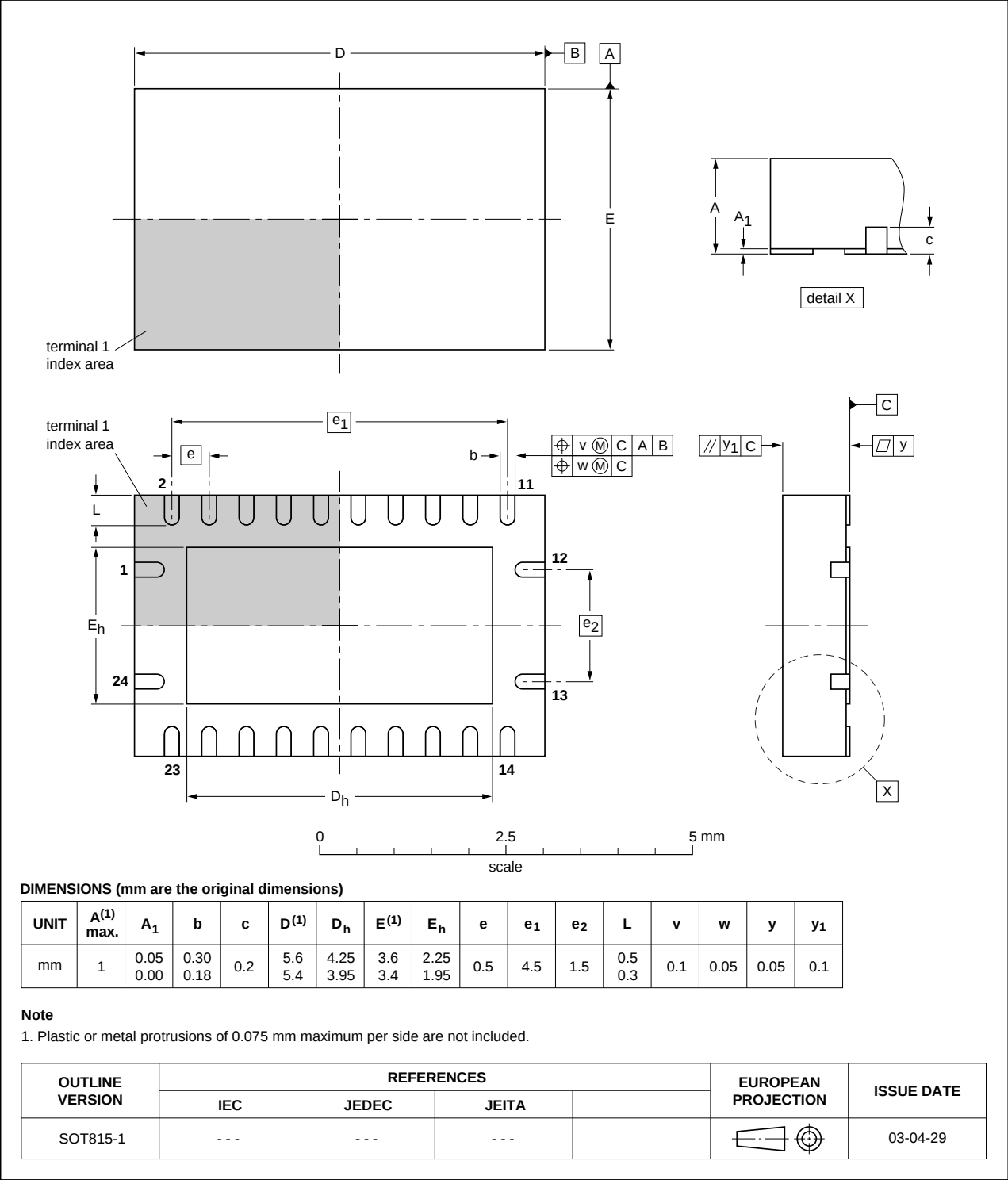


Fig 12. Package outline SOT815-1 (DHVQFN24)

## 13. Abbreviations

Table 9. Abbreviations

| Acronym | Description                 |
|---------|-----------------------------|
| ESD     | ElectroStatic Discharge     |
| HBM     | Human Body Model            |
| MM      | Machine Model               |
| TTL     | Transistor-Transistor Logic |

## 14. Revision history

Table 10. Revision history

| Document ID     | Release date                                                                                                                                                                | Data sheet status     | Change notice | Supersedes     |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|----------------|
| 74LVC4245A v.10 | 20121218                                                                                                                                                                    | Product data sheet    | -             | 74LVC4245A v.9 |
| Modifications:  | <ul style="list-style-type: none"> <li><math>V_{CC(A)}</math> and <math>V_{CC(B)}</math> changed into <math>V_{CC(A)}</math> and <math>V_{CC(B)}</math> (errata)</li> </ul> |                       |               |                |
| 74LVC4245A v.9  | 20121120                                                                                                                                                                    | Product data sheet    | -             | 74LVC4245A v.8 |
| Modifications:  | <ul style="list-style-type: none"> <li><a href="#">Figure 4</a>: Pin configuration drawing corrected for DHVQFN24 package</li> </ul>                                        |                       |               |                |
| 74LVC4245A v.8  | 20111122                                                                                                                                                                    | Product data sheet    | -             | 74LVC4245A v.7 |
| 74LVC4245A v.7  | 20110812                                                                                                                                                                    | Product data sheet    | -             | 74LVC4245A v.6 |
| 74LVC4245A v.6  | 20080118                                                                                                                                                                    | Product data sheet    | -             | 74LVC4245A v.5 |
| 74LVC4245A v.5  | 20040330                                                                                                                                                                    | Product specification | -             | 74LVC4245A v.4 |
| 74LVC4245A v.4  | 20040211                                                                                                                                                                    | Product specification | -             | 74LVC4245A v.3 |
| 74LVC4245A v.3  | 19990615                                                                                                                                                                    | Product specification | -             | 74LVC4245A v.2 |
| 74LVC4245A v.2  | 19980729                                                                                                                                                                    | Product specification | -             | 74LVC4245A v.1 |
| 74LVC4245A v.1  | 19980729                                                                                                                                                                    | 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.nexperia.com>.

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