

# 74ABT16543

16-bit latched transceiver with dual enable; 3-state

Rev. 04 — 26 May 2005

Product data sheet

## 1. General description

The 74ABT16543 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT16543 16-bit registered transceiver contains two sets of D-type latches for temporary storage of data flowing in either direction. Separate latch enable ( $\overline{\text{nLEAB}}$ ,  $\overline{\text{nLEBA}}$ ) and output enable ( $\overline{\text{nOEAB}}$ ,  $\overline{\text{nOEBA}}$ ) inputs are provided for each register to permit independent control of data transfer in either direction. The outputs are guaranteed to sink 64 mA.

## 2. Features

- Two 8-bit octal transceivers with D-type latch
- Live insertion and extraction permitted
- Power-up 3-state
- Power-up reset
- Multiple  $V_{CC}$  and GND pins minimize switching noise
- Back-to-back registers for storage
- Separate controls for data flow in each direction
- Output capability: +64 mA and –32 mA
- Latch-up protection exceeds 500 mA per JEDEC Std 78
- ESD protection:
  - ◆ MIL STD 883 method 3015: exceeds 2000 V
  - ◆ Machine model: exceeds 200 V

## 3. Quick reference data

Table 1: Quick reference data

$T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $GND = 0\text{ V}$

| Symbol    | Parameter                    | Conditions   | Min | Typ  | Max | Unit |
|-----------|------------------------------|--|-----|------|-----|------|
| $t_{PLH}$ | propagation delay nAx to nBx | $C_L = 50\text{ pF}$ ; $V_{CC} = 5\text{ V}$         | -   | 2.5  | -   | ns   |
| $t_{PHL}$ | propagation delay nAx to nBx | $C_L = 50\text{ pF}$ ; $V_{CC} = 5\text{ V}$         | -   | 2.2  | -   | ns   |
| $C_I$     | input capacitance            | $V_I = 0\text{ V}$ or $V_{CC}$                       | -   | 3    | -   | pF   |
| $C_{I/O}$ | I/O capacitance              | $V_O = 0\text{ V}$ or $V_{CC}$ ; 3-state             | -   | 7    | -   | pF   |
| $I_{CC}$  | quiescent supply current     | $V_{CC} = 5.5\text{ V}$ ; $V_I = GND$<br>or $V_{CC}$ |     |      |     |      |
|           |                              | outputs 3-state                                      | -   | 0.55 | -   | mA   |
|           |                              | outputs LOW-state                                    | -   | 9    | -   | mA   |

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### 4. Ordering information

Table 2: Ordering information

| Type number  | Package           |       |   | Version  |
|--------------|-------------------|-------|---|----------|
|              | Temperature range | Name  | Description   |          |
| 74ABT16543BB | -40 °C to +85 °C  | QFP52 | plastic quad flat package; 52 leads (lead length 1.6 mm); body width 10 × 10 × 2 mm | SOT379-2 |

### 5. Functional diagram

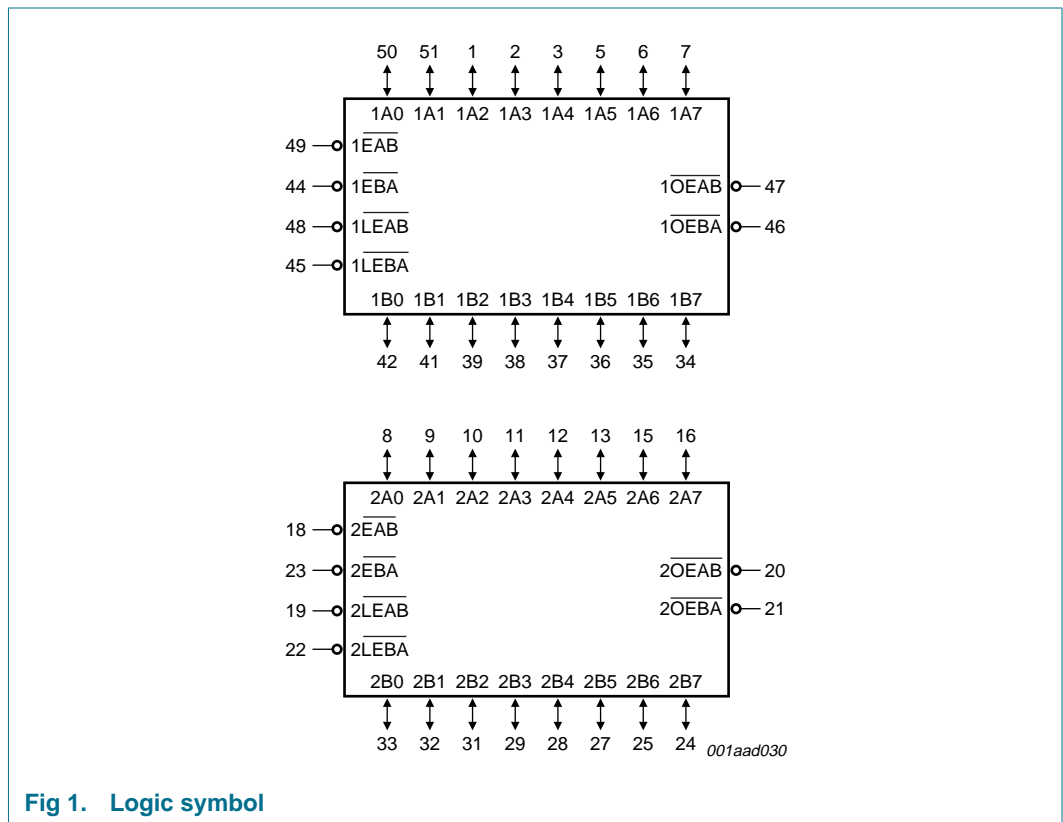
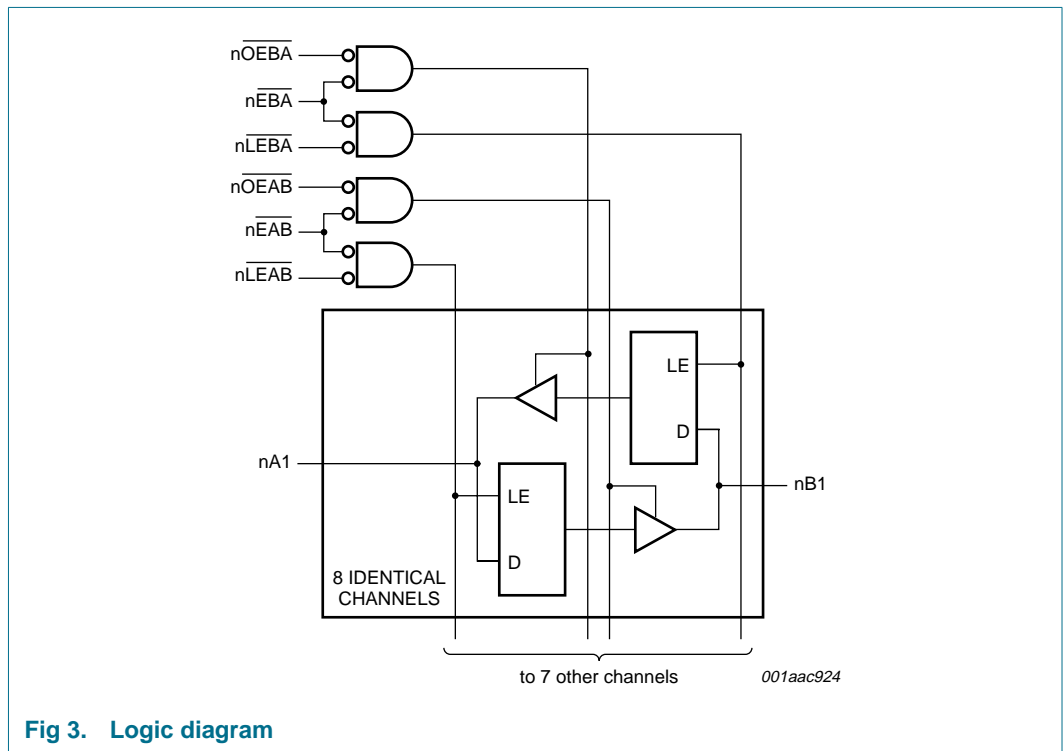
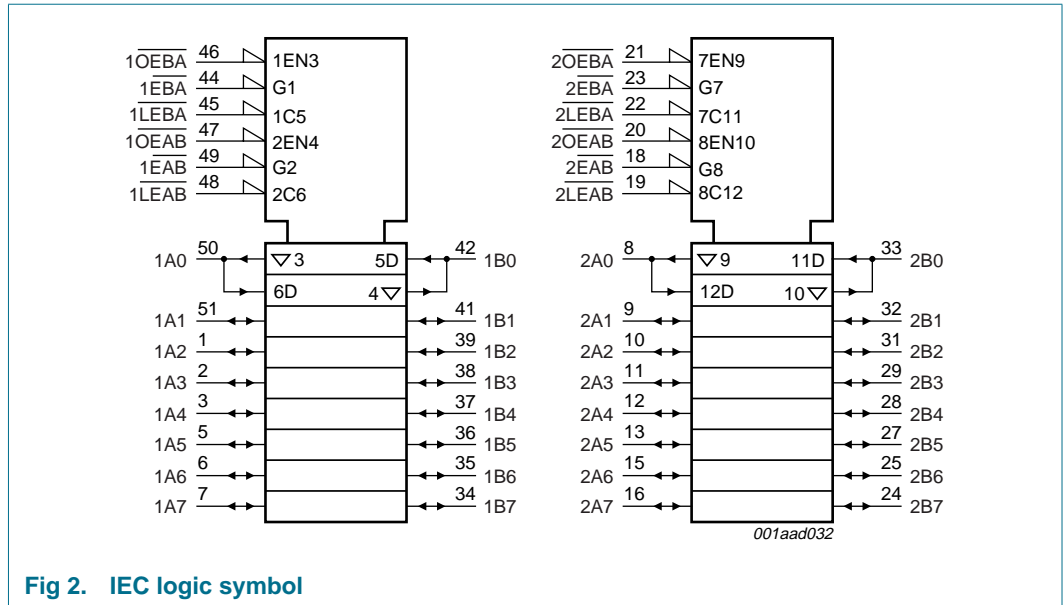


Fig 1. Logic symbol



## 6. Pinning information

### 6.1 Pinning

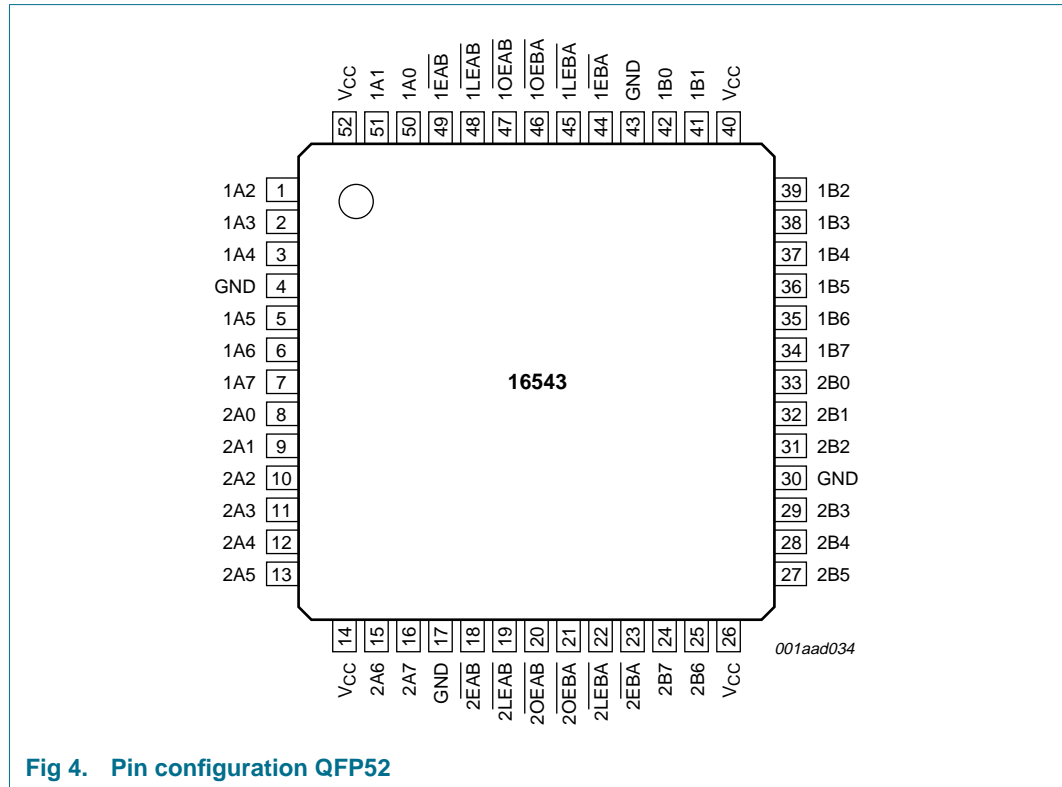


Fig 4. Pin configuration QFP52

### 6.2 Pin description

Table 3: Pin description

| Symbol          | Pin | Description                      |
|-----------------|-----|----------------------------------|
| 1A2             | 1   | 1 data input or output 2; A-side |
| 1A3             | 2   | 1 data input or output 3; A-side |
| 1A4             | 3   | 1 data input or output 4; A-side |
| GND             | 4   | ground (0 V)                     |
| 1A5             | 5   | 1 data input or output 5; A-side |
| 1A6             | 6   | 1 data input or output 6; A-side |
| 1A7             | 7   | 1 data input or output 7; A-side |
| 2A0             | 8   | 2 data input or output 0; A-side |
| 2A1             | 9   | 2 data input or output 1; A-side |
| 2A2             | 10  | 2 data input or output 2; A-side |
| 2A3             | 11  | 2 data input or output 3; A-side |
| 2A4             | 12  | 2 data input or output 4; A-side |
| 2A5             | 13  | 2 data input or output 5; A-side |
| V <sub>CC</sub> | 14  | supply voltage                   |
| 2A6             | 15  | 2 data input or output 6; A-side |

Table 3: Pin description ...continued

| Symbol             | Pin | Description                             |
|--------------------|-----|---|
| 2A7                | 16  | 2 data input or output 7; A-side        |
| GND                | 17  | ground (0 V)                            |
| $\overline{2EAB}$  | 18  | A-to-B output enable input (active LOW) |
| $\overline{2LEAB}$ | 19  | A-to-B latch enable input (active LOW)  |
| $\overline{2OEAB}$ | 20  | A-to-B enable input (active LOW)        |
| $\overline{2OEBA}$ | 21  | B-to-A output enable input (active LOW) |
| $\overline{2LEBA}$ | 22  | B-to-A latch enable input (active LOW)  |
| $\overline{2EBA}$  | 23  | B-to-A enable input (active LOW)        |
| 2B7                | 24  | 2 data input or output 7; B-side        |
| 2B6                | 25  | 2 data input or output 6; B-side        |
| V <sub>CC</sub>    | 26  | supply voltage                          |
| 2B5                | 27  | 2 data input or output 5; B-side        |
| 2B4                | 28  | 2 data input or output 4; B-side        |
| 2B3                | 29  | 2 data input or output 3; B-side        |
| GND                | 30  | ground (0 V)                            |
| 2B2                | 31  | 2 data input or output 2; B-side        |
| 2B1                | 32  | 2 data input or output 1; B-side        |
| 2B0                | 33  | 2 data input or output 0; B-side        |
| 1B7                | 34  | 1 data input or output 7; B-side        |
| 1B6                | 35  | 1 data input or output 6; B-side        |
| 1B5                | 36  | 1 data input or output 5; B-side        |
| 1B4                | 37  | 1 data input or output 4; B-side        |
| 1B3                | 38  | 1 data input or output 3; B-side        |
| 1B2                | 39  | 1 data input or output 2; B-side        |
| V <sub>CC</sub>    | 40  | positive supply voltage                 |
| 1B1                | 41  | 1 data input or output 1; B-side        |
| 1B0                | 42  | 1 data input or output 0; B-side        |
| GND                | 43  | ground (0 V)                            |
| $\overline{1EBA}$  | 44  | B-to-A output enable input (active LOW) |
| $\overline{1LEBA}$ | 45  | B-to-A latch enable input (active LOW)  |
| $\overline{1OEBA}$ | 46  | B-to-A enable input (active LOW)        |
| $\overline{1OEAB}$ | 47  | A-to-B output enable input (active LOW) |
| $\overline{1LEAB}$ | 48  | A-to-B latch enable input (active LOW)  |
| $\overline{1EAB}$  | 49  | A-to-B enable input (active LOW)        |
| 1A0                | 50  | 1 data input or output 0; A-side        |
| 1A1                | 51  | 1 data input or output 1; A-side        |
| V <sub>CC</sub>    | 52  | supply voltage                          |

## 7. Functional description

### 7.1 Function table

Table 4: Function table <sup>[1]</sup>

| Input          |              |                |            | Output     | Status           |
|----------------|--------------|----------------|------------|------------|------------------|
| nOEAB or nOEBA | nEAB or nEBA | nLEAB or nLEBA | nAx or nBx | nBx or nAx |                  |
| H              | X            | X              | X          | Z          | disabled         |
| X              | H            | X              | X          | Z          | disabled         |
| L              | ↑            | L              | h          | Z          | disabled + latch |
| L              | ↑            | L              | l          | Z          | disabled + latch |
| L              | L            | ↑              | h          | H          | latch + display  |
| L              | L            | ↑              | l          | L          | latch + display  |
| L              | L            | L              | H          | H          | transparent      |
| L              | L            | L              | L          | L          | transparent      |
| L              | L            | H              | X          | NC         | hold             |

- [1] H = HIGH voltage level;  
 h = HIGH voltage level one set-up time prior to the LOW-to-HIGH transition of  $\overline{nLEAB}$ ,  $\overline{nLEBA}$ ,  $\overline{nEAB}$  or  $\overline{nEBA}$ ;  
 L = LOW voltage level;  
 l = LOW voltage level one set-up time prior to the LOW-to-HIGH transition of  $\overline{nLEAB}$ ,  $\overline{nLEBA}$ ,  $\overline{nEAB}$  or  $\overline{nEBA}$ ;  
 X = don't care;  
 Z = high-impedance off state;  
 ↑ = LOW-to-HIGH transition;  
 NC = no change.

### 7.2 Description

The 74ABT16543 contains two sets of eight D-type latches, with separate control pins for each set. Using data flow from A to B as an example, when the A-to-B enable ( $\overline{nEAB}$ ) input and the A-to-B latch enable ( $\overline{nLEAB}$ ) input are LOW the A-to-B path is transparent.

A subsequent LOW-to-HIGH transition of the  $\overline{nLEAB}$  signal puts the A data into the latches where it is stored and the B outputs no longer change with the A inputs. With  $\overline{nEAB}$  and  $\overline{nOEAB}$  both LOW, the 3-state B output buffers are active and display the data present at the outputs of the A latches.

Control of data flow from B to A is similar, but using the  $\overline{nEBA}$ ,  $\overline{nLEBA}$ , and  $\overline{nOEBA}$  inputs.

## 8. Limiting values

**Table 5: 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     | +7.0 | V    |
| $V_I$     | input voltage        |                                   | [1] -1.2 | +7.0 | V    |
| $V_O$     | output voltage       | output in OFF-state or HIGH-state | [1] -0.5 | +5.5 | V    |
| $I_{IK}$  | input diode current  | $V_I < 0$ V                       | -        | -18  | mA   |
| $I_{OK}$  | output diode current | $V_O < 0$ V                       | -        | -50  | mA   |
| $I_O$     | output current       | output in LOW-state               | -        | 128  | mA   |
|           |                      | output in HIGH-state              | -        | -64  | mA   |
| $T_j$     | junction temperature |                                   | [2] -    | +150 | °C   |
| $T_{stg}$ | storage temperature  |                                   | -65      | +150 | °C   |

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

[2] The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability.

## 9. Recommended operating conditions

**Table 6: Recommended operating conditions**

| Symbol              | Parameter                          | Conditions  | Min | Typ | Max      | Unit |
|---------------------|------------------------------------|-------------|-----|-----|----------|------|
| $V_{CC}$            | supply voltage                     |             | 4.5 | -   | 5.5      | V    |
| $V_I$               | input voltage                      |             | 0   | -   | $V_{CC}$ | V    |
| $V_{IH}$            | HIGH-level input voltage           |             | 2.0 | -   | -        | V    |
| $V_{IL}$            | LOW-level input voltage            |             | -   | -   | 0.8      | V    |
| $I_{OH}$            | HIGH-level output current          |             | -   | -   | -32      | mA   |
| $I_{OL}$            | LOW-level output current           |             | -   | -   | 64       | mA   |
| $\Delta t/\Delta V$ | input transition rise or fall rate |             | 0   | -   | 10       | ns/V |
| $T_{amb}$           | ambient temperature                | in free air | -40 | -   | +85      | °C   |

## 10. Static characteristics

**Table 7: Static characteristics**
*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>IK</sub>                           | input clamp voltage                                | V <sub>CC</sub> = 4.5 V; I <sub>IK</sub> = -18 mA   | -   | -     | -1.2 | V    |    |
| V <sub>OH</sub>                           | HIGH-level output voltage                          | V <sub>CC</sub> = 4.5 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>  |     |       |      |      |    |
|   |  | I <sub>OH</sub> = -3 mA   | 2.5 | 2.9   | -    | V    |    |
|   |  | I <sub>OH</sub> = -32 mA  | 2.0 | 2.4   | -    | V    |    |
|   |  | V <sub>CC</sub> = 5.0 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>  |     |       |      |      |    |
|   | I <sub>OH</sub> = -3 mA                            | 3.0   | 3.4 | -     | V    |      |    |
| V <sub>OL</sub>                           | LOW-level output voltage                           | V <sub>CC</sub> = 4.5 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub> ; I <sub>OL</sub> = 64 mA  | -   | 0.36  | 0.55 | V    |    |
| V <sub>RST</sub>                          | power-up output voltage                            | V <sub>CC</sub> = 5.5 V; I <sub>O</sub> = 1 mA; V <sub>I</sub> = GND or V <sub>CC</sub>   | [1] | -     | 0.13 | 0.55 | V  |
| I <sub>LI</sub>                           | input leakage current of control pins              | V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = GND or 5.5 V  | -   | ±0.01 | ±1.0 | µA   |    |
| I <sub>OFF</sub>                          | power-off leakage current                          | V <sub>CC</sub> = 0.0 V; V <sub>O</sub> or V <sub>I</sub> ≤ 4.5 V   | -   | ±2.0  | ±100 | µA   |    |
| I <sub>PU</sub> , I <sub>PD</sub>         | power-up or power-down down 3-state output current | V <sub>CC</sub> = 2.1 V; V <sub>O</sub> = 0.0 V or V <sub>CC</sub> ; V <sub>I</sub> = GND or V <sub>CC</sub> ; V <sub>noEAB</sub> and V <sub>noEBA</sub> = don't care | [2] | -     | ±1.0 | ±50  | µA |
| I <sub>OZ</sub>                           | 3-state output current                             | V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>  |     |       |      |      |    |
|   |  | outputs HIGH-state at V <sub>O</sub> = 5.5 V  | -   | 1.0   | 10   | µA   |    |
|   |  | outputs LOW-state at V <sub>O</sub> = 0.0 V   | -   | -1.0  | -10  | µA   |    |
| I <sub>CEx</sub>                          | output HIGH leakage current                        | V <sub>CC</sub> = 5.5 V; V <sub>O</sub> = 5.5 V; V <sub>I</sub> = GND or V <sub>CC</sub>  | -   | 1.0   | 50   | µA   |    |
| I <sub>O</sub>                            | output current                                     | V <sub>CC</sub> = 5.5 V; V <sub>O</sub> = 2.5 V   | [3] | -50   | -100 | -200 | mA |
| C <sub>I</sub>                            | input capacitance                                  | V <sub>I</sub> = 0 V or V <sub>CC</sub>   | -   | 3     | -    | pF   |    |
| C <sub>I/O</sub>                          | I/O capacitance                                    | V <sub>O</sub> = 0 V or V <sub>CC</sub> ; 3-state   | -   | 7     | -    | pF   |    |
| I <sub>CC</sub>                           | quiescent supply current                           | V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = GND or V <sub>CC</sub>  |     |       |      |      |    |
|   |  | outputs HIGH-state  | -   | 0.55  | 2    | mA   |    |
|   |  | outputs LOW-state   | -   | 9     | 19   | mA   |    |
|   |  | outputs 3-state   | -   | 0.55  | 2    | mA   |    |
| ΔI <sub>CC</sub>                          | additional supply current per input pin            | V <sub>CC</sub> = 5.5 V; one input at 3.4 V; other inputs at V <sub>CC</sub> or GND   | [4] | -     | 5.0  | 50   | µA |
| <b>T<sub>amb</sub> = -40 °C to +85 °C</b> |  |   |     |       |      |      |    |
| V <sub>IK</sub>                           | input clamp voltage                                | V <sub>CC</sub> = 4.5 V; I <sub>IK</sub> = -18 mA   | -   | -     | -1.2 | V    |    |
| V <sub>OH</sub>                           | HIGH-level output voltage                          | V <sub>CC</sub> = 4.5 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>  |     |       |      |      |    |
|   |  | I <sub>OH</sub> = -3 mA   | 2.5 | -     | -    | V    |    |
|   |  | I <sub>OH</sub> = -32 mA  | 2.0 | -     | -    | V    |    |
|   |  | V <sub>CC</sub> = 5.0 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>  |     |       |      |      |    |
|   | I <sub>OH</sub> = -3 mA                            | 3.0   | -   | -     | V    |      |    |
| V <sub>OL</sub>                           | LOW-level output voltage                           | V <sub>CC</sub> = 4.5 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub> ; I <sub>OL</sub> = 64 mA  |     |       | 0.55 | V    |    |
| V <sub>RST</sub>                          | power-up output voltage                            | V <sub>CC</sub> = 5.5 V; I <sub>O</sub> = 1 mA; V <sub>I</sub> = GND or V <sub>CC</sub>   | [1] | -     | -    | 0.55 | V  |
| I <sub>LI</sub>                           | input leakage current of control pins              | V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = GND or 5.5 V  | -   | -     | ±1.0 | µA   |    |
| I <sub>OFF</sub>                          | power-off leakage current                          | V <sub>CC</sub> = 0.0 V; V <sub>O</sub> or V <sub>I</sub> ≤ 4.5 V   | -   | -     | ±100 | µA   |    |



**Table 7: Static characteristics ...continued**

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

| Symbol           | Parameter  | Conditions   | Min     | Typ | Max      | Unit          |
|------------------|--|--|---------|-----|----------|---------------|
| $I_{PU}, I_{PD}$ | power-up or power-down down 3-state output current | $V_{CC} = 2.1\text{ V}; V_O = 0.0\text{ V}$ or $V_{CC}; V_I = \text{GND}$ or $V_{CC}; V_{nOEAB}$ and $V_{nOEBA} = \text{don't care}$ | [2] -   | -   | $\pm 50$ | $\mu\text{A}$ |
| $I_{OZ}$         | 3-state output current                             | $V_{CC} = 5.5\text{ V}; V_I = V_{IL}$ or $V_{IH}$  | -       | -   | 10       | $\mu\text{A}$ |
|                  |  | outputs HIGH-state at $V_O = 5.5\text{ V}$   | -       | -   | -10      | $\mu\text{A}$ |
|                  |  | outputs LOW-state at $V_O = 0.0\text{ V}$  | -       | -   | 50       | $\mu\text{A}$ |
| $I_{CEX}$        | output HIGH leakage current                        | $V_{CC} = 5.5\text{ V}; V_O = 5.5\text{ V}; V_I = \text{GND}$ or $V_{CC}$  | -       | -   | 50       | $\mu\text{A}$ |
| $I_O$            | output current                                     | $V_{CC} = 5.5\text{ V}; V_O = 2.5\text{ V}$  | [3] -50 | -   | -200     | mA            |
| $I_{CC}$         | quiescent supply current                           | $V_{CC} = 5.5\text{ V}; V_I = \text{GND}$ or $V_{CC}$  | -       | -   | 2        | mA            |
|                  |  | outputs HIGH-state   | -       | -   | 19       | mA            |
|                  |  | outputs LOW-state  | -       | -   | 2        | mA            |
|                  |  | outputs 3-state  | -       | -   | 50       | $\mu\text{A}$ |
| $\Delta I_{CC}$  | additional supply current per input pin            | $V_{CC} = 5.5\text{ V};$ one input at 3.4 V; other inputs at $V_{CC}$ or GND   | [4] -   | -   | 50       | $\mu\text{A}$ |

- [1] For valid test results, data must not be loaded into the latches after applying the power.
- [2] This parameter is valid for any  $V_{CC}$  between 0 V and 2.1 V, with a transition time of up to 10 ms; From  $V_{CC} = 2.1\text{ V}$  to  $V_{CC} = 5\text{ V} \pm 10\%$  a transition time of up to 100  $\mu\text{s}$  is permitted.
- [3] Not more than one output should be tested at a time, and the duration of the test should not exceed one second.
- [4] This is the increase in supply current for each input at 3.4 V.

## 11. Dynamic characteristics

**Table 8: Dynamic characteristics**

$GND = 0\text{ V};$  for test circuit see [Figure 10](#).

| Symbol  | Parameter  | Conditions                   | Min | Typ | Max | Unit |
|---|--|------------------------------|-----|-----|-----|------|
| <b><math>T_{amb} = 25\text{ }^\circ\text{C}; V_{CC} = 5.0\text{ V}</math></b> |  |                              |     |     |     |      |
| $t_{PLH}$   | propagation delay                                    |                              |     |     |     |      |
|   | nAx to nBx, nBx to nAx                               | see <a href="#">Figure 6</a> | 1.0 | 2.5 | 3.3 | ns   |
|   | $\overline{nLEBA}$ to nAx, $\overline{nLEAB}$ to nBx | see <a href="#">Figure 5</a> | 1.0 | 3.1 | 4.3 | ns   |
| $t_{PHL}$   | propagation delay                                    |                              |     |     |     |      |
|   | nAx to nBx, nBx to nAx                               | see <a href="#">Figure 6</a> | 1.0 | 2.2 | 4.4 | ns   |
|   | $\overline{nLEBA}$ to nAx, $\overline{nLEAB}$ to nBx | see <a href="#">Figure 5</a> | 1.2 | 3.0 | 4.8 | ns   |
| $t_{PZH}$   | output enable time                                   | see <a href="#">Figure 7</a> |     |     |     |      |
|   | $\overline{nOEBA}$ to nAx, $\overline{nOEAB}$ to nBx |                              | 1.0 | 3.3 | 4.3 | ns   |
|   | $\overline{nEBA}$ to nAx, $\overline{nEAB}$ to nBx   |                              | 1.0 | 3.4 | 4.9 | ns   |
| $t_{PZL}$   | output enable time                                   | see <a href="#">Figure 8</a> |     |     |     |      |
|   | $\overline{nOEBA}$ to nAx, $\overline{nOEAB}$ to nBx |                              | 1.1 | 3.3 | 5.9 | ns   |
|   | $\overline{nEBA}$ to nAx, $\overline{nEAB}$ to nBx   |                              | 1.2 | 3.4 | 6.5 | ns   |
| $t_{PHZ}$   | output disable time                                  | see <a href="#">Figure 7</a> |     |     |     |      |
|   | $\overline{nOEBA}$ to nAx, $\overline{nOEAB}$ to nBx |                              | 1.9 | 3.5 | 5.0 | ns   |
|   | $\overline{nEBA}$ to nAx, $\overline{nEAB}$ to nBx   |                              | 2.0 | 3.4 | 5.6 | ns   |

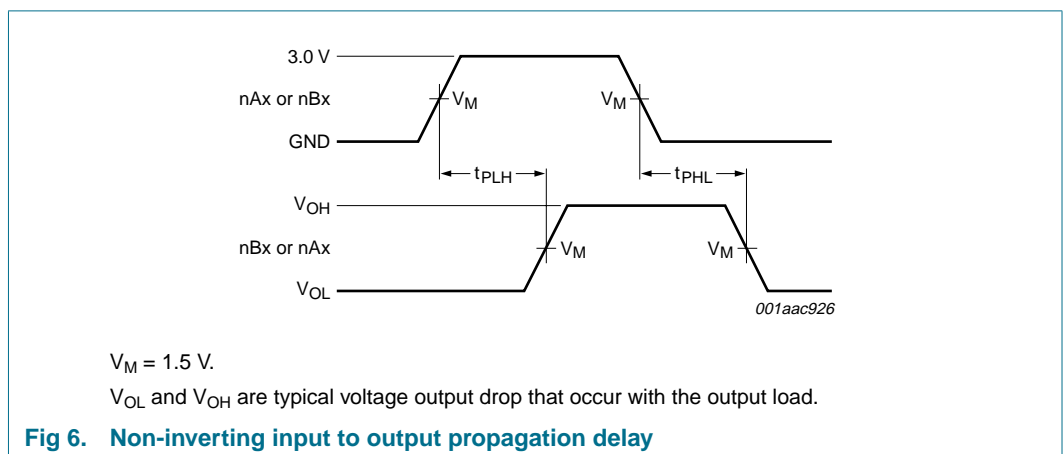
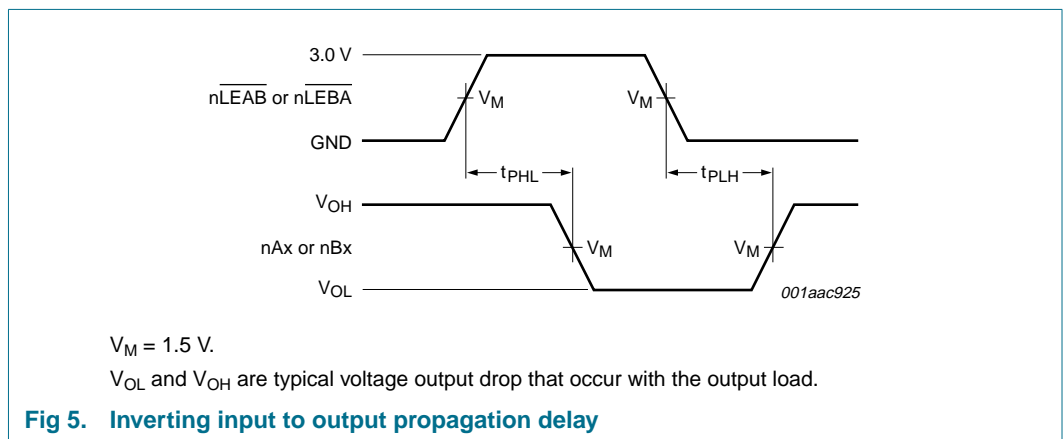
**Table 8: Dynamic characteristics ...continued**  
*GND = 0 V; for test circuit see Figure 10.*

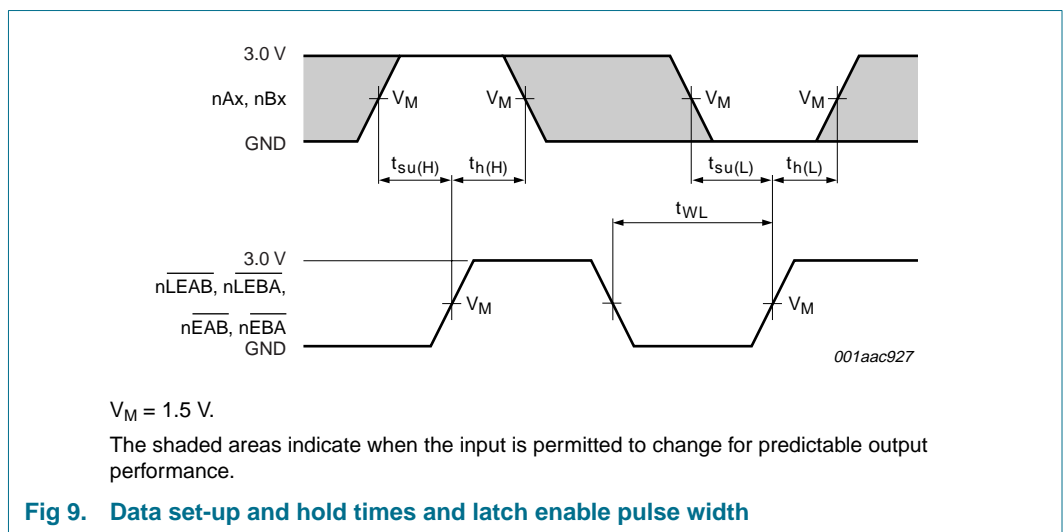
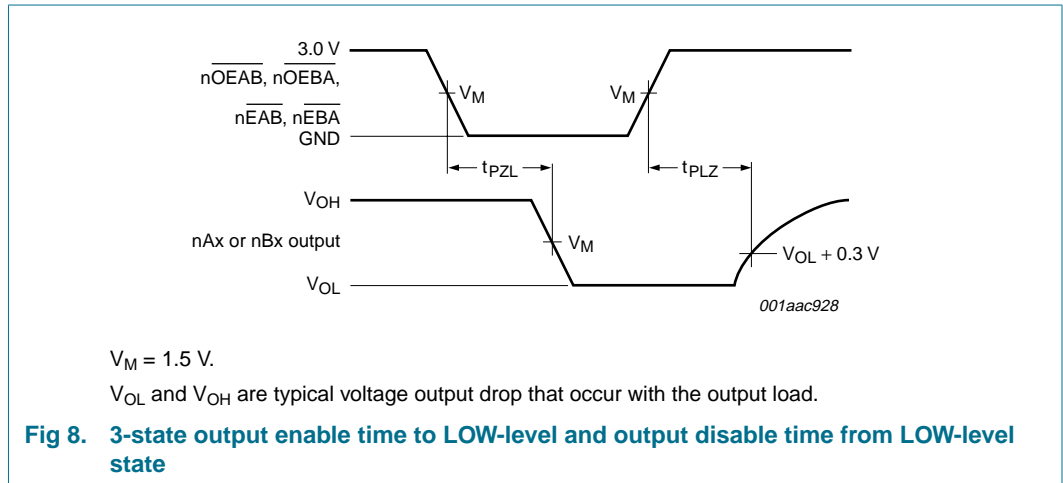
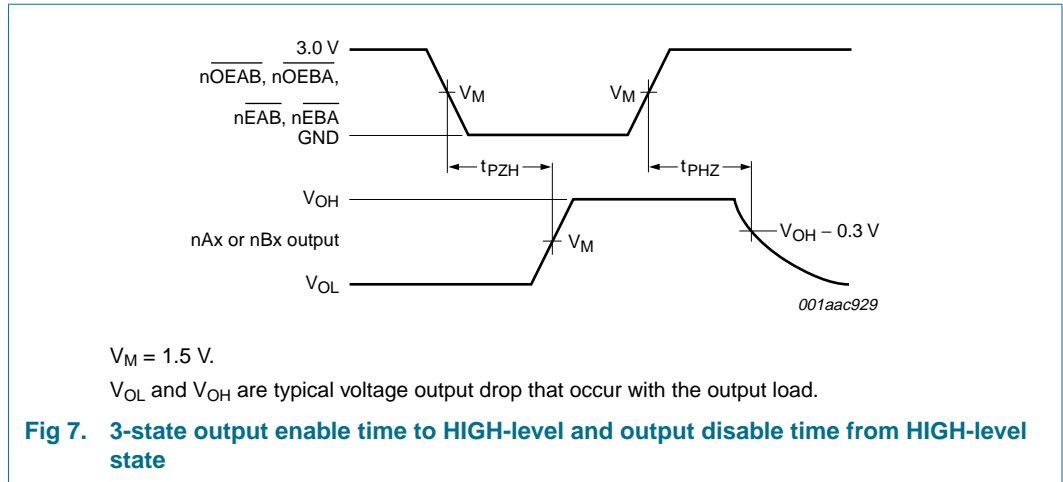
| Symbol  | Parameter                  | Conditions                   | Min  | Typ  | Max | Unit |
|---|----------------------------|------------------------------|------|------|-----|------|
| t <sub>PLZ</sub>  | output disable time        | see <a href="#">Figure 8</a> |      |      |     |      |
|   | nOEBA to nAx, nOEAB to nBx |                              | 1.6  | 2.6  | 4.2 | ns   |
|   | nEBA to nAx, nEAB to nBx   |                              | 1.7  | 2.6  | 5.1 | ns   |
| t <sub>su(H)</sub>  | set-up time HIGH           | see <a href="#">Figure 9</a> |      |      |     |      |
|   | nAx to nLEAB, nBx to nLEBA |                              | 1.5  | 0.4  | -   | ns   |
|   | nAx to nEAB, nBx to nEBA   |                              | 1.5  | 0.2  | -   | ns   |
| t <sub>su(L)</sub>  | set-up time LOW            | see <a href="#">Figure 9</a> |      |      |     |      |
|   | nAx to nLEAB, nBx to nLEBA |                              | +3.5 | -0.1 | -   | ns   |
|   | nAx to nEAB, nBx to nEBA   |                              | +3.5 | -0.3 | -   | ns   |
| t <sub>h(H)</sub>   | hold time HIGH             | see <a href="#">Figure 9</a> |      |      |     |      |
|   | nAx to nLEAB, nBx to nLEBA |                              | 1.5  | 0.2  | -   | ns   |
|   | nAx to nEAB, nBx to nEBA   |                              | 1.5  | 0.3  | -   | ns   |
| t <sub>h(L)</sub>   | hold time LOW              | see <a href="#">Figure 9</a> |      |      |     |      |
|   | nAx to nLEAB, nBx to nLEBA |                              | +2.0 | -0.3 | -   | ns   |
|   | nAx to nEAB, nBx to nEBA   |                              | +2.0 | -0.2 | -   | ns   |
| t <sub>WL</sub>   | pulse width LOW            | see <a href="#">Figure 9</a> | 4.0  | 3.1  | -   | ns   |
| <b>T<sub>amb</sub> = -40 °C to +85 °C; V<sub>CC</sub> = 5.0 V ± 0.5 V</b> |                            |                              |      |      |     |      |
| t <sub>PLH</sub>  | propagation delay          |                              |      |      |     |      |
|   | nAx to nBx, nBx to nAx     | see <a href="#">Figure 6</a> | 1.0  | -    | 3.8 | ns   |
|   | nLEBA to nAx, nLEAB to nBx | see <a href="#">Figure 5</a> | 1.0  | -    | 5.2 | ns   |
| t <sub>PHL</sub>  | propagation delay          |                              |      |      |     |      |
|   | nAx to nBx, nBx to nAx     | see <a href="#">Figure 6</a> | 1.0  | -    | 5.1 | ns   |
|   | nLEBA to nAx, nLEAB to nBx | see <a href="#">Figure 5</a> | 1.2  | -    | 5.6 | ns   |
| t <sub>PZH</sub>  | output enable time         | see <a href="#">Figure 7</a> |      |      |     |      |
|   | nOEBA to nAx, nOEAB to nBx |                              | 1.0  | -    | 5.2 | ns   |
|   | nEBA to nAx, nEAB to nBx   |                              | 1.0  | -    | 6.2 | ns   |
| t <sub>PZL</sub>  | output enable time         | see <a href="#">Figure 8</a> |      |      |     |      |
|   | nOEBA to nAx, nOEAB to nBx |                              | 1.1  | -    | 7.0 | ns   |
|   | nEBA to nAx, nEAB to nBx   |                              | 1.2  | -    | 7.8 | ns   |
| t <sub>PHZ</sub>  | output disable time        | see <a href="#">Figure 7</a> |      |      |     |      |
|   | nOEBA to nAx, nOEAB to nBx |                              | 1.9  | -    | 5.7 | ns   |
|   | nEBA to nAx, nEAB to nBx   |                              | 2.0  | -    | 6.6 | ns   |
| t <sub>PLZ</sub>  | output disable time        | see <a href="#">Figure 8</a> |      |      |     |      |
|   | nOEBA to nAx, nOEAB to nBx |                              | 1.6  | -    | 4.6 | ns   |
|   | nEBA to nAx, nEAB to nBx   |                              | 1.7  | -    | 5.4 | ns   |
| t <sub>su(H)</sub>  | set-up time HIGH           | see <a href="#">Figure 9</a> |      |      |     |      |
|   | nAx to nLEAB, nBx to nLEBA |                              | 1.5  | -    | -   | ns   |
|   | nAx to nEAB, nBx to nEBA   |                              | 1.5  | -    | -   | ns   |

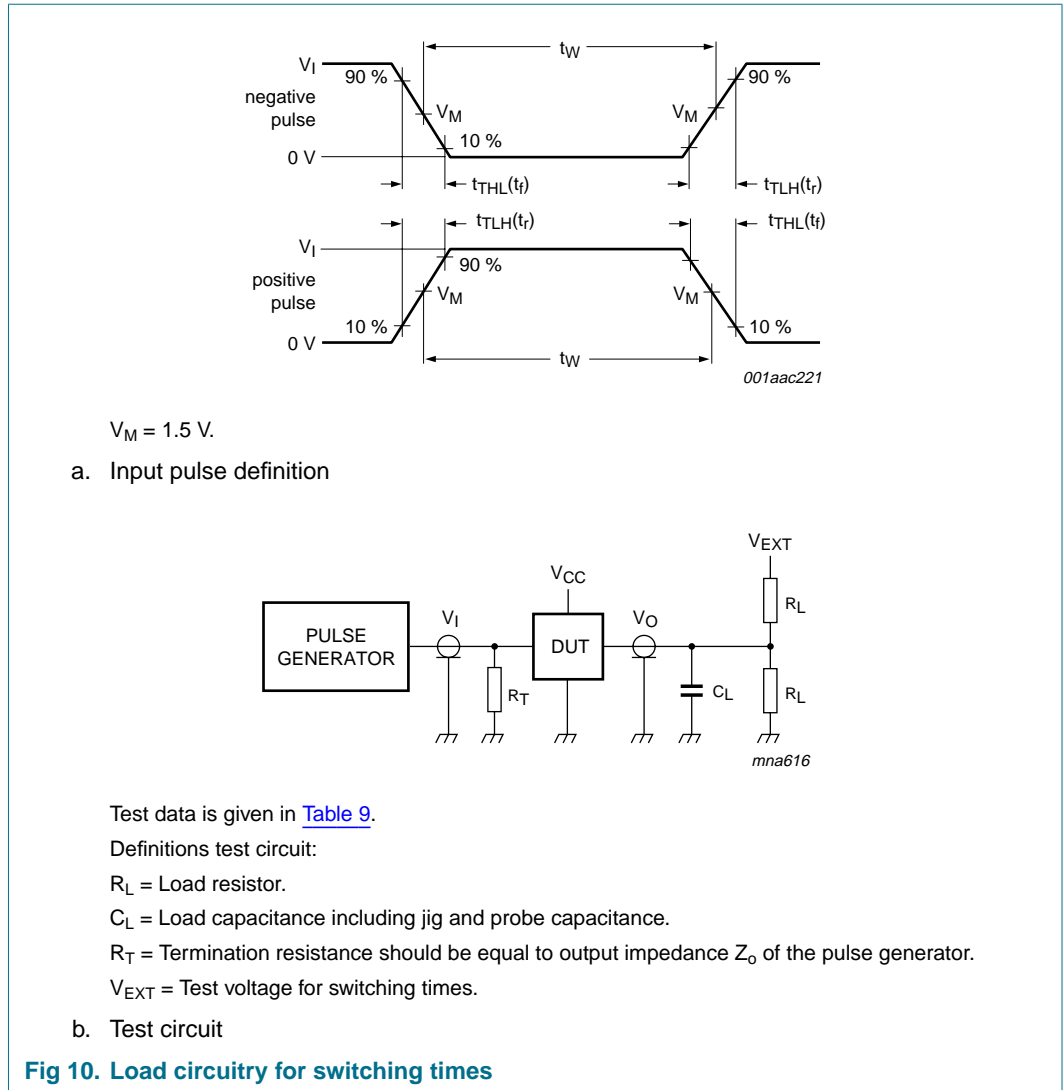
**Table 8: Dynamic characteristics ...continued**  
*GND = 0 V; for test circuit see Figure 10.*

| Symbol      | Parameter   | Conditions   | Min | Typ | Max | Unit |
|-------------|---|--------------|-----|-----|-----|------|
| $t_{su(L)}$ | set-up time LOW                                       | see Figure 9 |     |     |     |      |
|             | nAx to $\overline{nLEAB}$ , nBx to $\overline{nLEBA}$ |              | 3.5 | -   | -   | ns   |
|             | nAx to $\overline{nEAB}$ , nBx to $\overline{nEBA}$   |              | 3.5 | -   | -   | ns   |
| $t_{h(H)}$  | hold time HIGH  | see Figure 9 |     |     |     |      |
|             | nAx to $\overline{nLEAB}$ , nBx to $\overline{nLEBA}$ |              | 1.5 | -   | -   | ns   |
|             | nAx to $\overline{nEAB}$ , nBx to $\overline{nEBA}$   |              | 1.5 | -   | -   | ns   |
| $t_{h(L)}$  | hold time LOW   | see Figure 9 |     |     |     |      |
|             | nAx to $\overline{nLEAB}$ , nBx to $\overline{nLEBA}$ |              | 2.0 | -   | -   | ns   |
|             | nAx to $\overline{nEAB}$ , nBx to $\overline{nEBA}$   |              | 2.0 | -   | -   | ns   |
| $t_{WL}$    | pulse width LOW                                       | see Figure 9 | 4.0 | -   | -   | ns   |

## 12. Waveforms







**Table 9: Test data**

| Input |       |        |                      | Load  |              | $V_{EXT}$          |                    |                    |
|-------|-------|--------|----------------------|-------|--------------|--------------------|--------------------|--------------------|
| $V_I$ | $f_i$ | $t_w$  | $t_r, t_f$           | $C_L$ | $R_L$        | $t_{PHZ}, t_{PZH}$ | $t_{PLZ}, t_{PZL}$ | $t_{PLH}, t_{PHL}$ |
| 3.0 V | 1 MHz | 500 ns | $\leq 2.5\text{ ns}$ | 50 pF | 500 $\Omega$ | open               | 7.0 V              | open               |

13. Package outline

QFP52: plastic quad flat package; 52 leads (lead length 1.6 mm); body 10 x 10 x 2 mm

SOT379-2

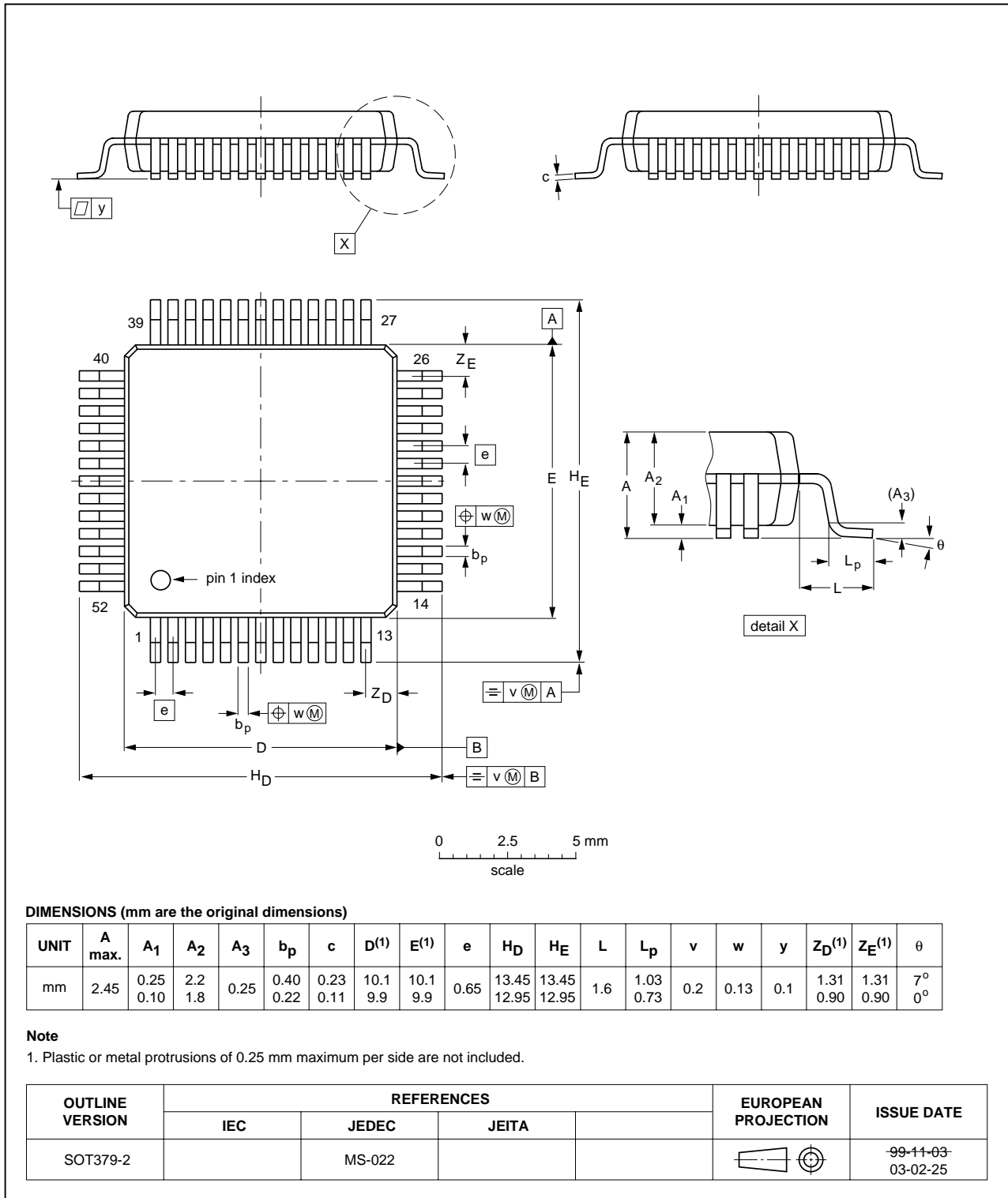


Fig 11. Package outline SOT379-2 (QFP52)

## 14. Revision history

Table 10: Revision history

| Document ID    | Release date   | Data sheet status  | Change notice | Doc. number    | Supersedes   |
|----------------|--|--------------------|---------------|----------------|--------------|
| 74ABT16543_4   | 20050526   | Product data sheet | -             | 9397 750 15046 | 74ABT16543_3 |
| Modifications: | <ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors.</li> <li><a href="#">Section 2 "Features"</a>: Changed JEDEC Std 17 to JEDEC Std 78</li> <li>QFP52 package information added to and (T)SSOP56 packages removed from <a href="#">Section 4 "Ordering information"</a>, <a href="#">Section 5 "Functional diagram"</a>, <a href="#">Section 6 "Pinning information"</a> and <a href="#">Section 13 "Package outline"</a></li> </ul> |                    |               |                |              |
| 74ABT16543_3   | 20020403   | Product data sheet | -             | 9397 750 09692 | -            |

## 15. Data sheet status

| Level | Data sheet status <sup>[1]</sup> | Product status <sup>[2] [3]</sup> | Definition   |
|-------|----------------------------------|-----------------------------------|--|
| I     | Objective data                   | Development                       | This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.  |
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[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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Date of release: 26 May 2005  
Document number: 9397 750 15046

Published in The Netherlands