

# 74AHC00; 74AHCT00

## Quad 2-input NAND gate

Rev. 04 — 28 April 2008

Product data sheet

### 1. General description

The 74AHC00; 74AHCT00 is a high-speed Si-gate CMOS device and is pin compatible with Low-power Schottky TTL (LSTTL). It is specified in compliance with JEDEC standard No. JESD7-A.

The 74AHC00; 74AHCT00 provides the quad 2-input NAND function.

### 2. Features

- Balanced propagation delays
- All inputs have Schmitt-trigger actions
- Inputs accept voltages higher than  $V_{CC}$
- Input levels:
  - ◆ For 74AHC00: CMOS level
  - ◆ For 74AHCT00: TTL level
- ESD protection:
  - ◆ HBM EIA/JESD22-A114E exceeds 2000 V
  - ◆ MM EIA/JESD22-A115-A exceeds 200 V
  - ◆ CDM EIA/JESD22-C101C exceeds 1000 V
- Multiple package options
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$

### 3. Ordering information

Table 1. Ordering information

| Type number    | Package                                                         |          |                                                                                                                                                       |          |
|----------------|-----------------------------------------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|                | Temperature range                                               | Name     | Description                                                                                                                                           | Version  |
| <b>74AHC00</b> |                                                                 |          |                                                                                                                                                       |          |
| 74AHC00D       | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | SO14     | plastic small outline package; 14 leads;<br>body width 3.9 mm                                                                                         | SOT108-1 |
| 74AHC00PW      | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | TSSOP14  | plastic thin shrink small outline package; 14 leads;<br>body width 4.4 mm                                                                             | SOT402-1 |
| 74AHC00BQ      | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | DHVQFN14 | plastic dual in-line compatible thermal enhanced very<br>thin quad flat package; no leads; 14 terminals;<br>body $2.5 \times 3 \times 0.85\text{ mm}$ | SOT762-1 |

Table 1. Ordering information ...continued

| Type number | Package           |          |                                                                                                                                 |          |
|-------------|-------------------|----------|---------------------------------------------------------------------------------------------------------------------------------|----------|
|             | Temperature range | Name     | Description                                                                                                                     | Version  |
| 74AHCT00    |                   |          |                                                                                                                                 |          |
| 74AHCT00D   | −40 °C to +125 °C | SO14     | plastic small outline package; 14 leads;<br>body width 3.9 mm                                                                   | SOT108-1 |
| 74AHCT00PW  | −40 °C to +125 °C | TSSOP14  | plastic thin shrink small outline package; 14 leads;<br>body width 4.4 mm                                                       | SOT402-1 |
| 74AHCT00BQ  | −40 °C to +125 °C | DHVQFN14 | plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals;<br>body 2.5 × 3 × 0.85 mm | SOT762-1 |

4. Functional diagram

Fig 1. Logic symbol

Fig 2. IEC logic symbol

Fig 3. Logic diagram (one gate)

5. Pinning information

5.1 Pinning

Fig 4. Pin configuration SO14 and TSSOP14

Fig 5. Pin configuration DHVQFN14

## 5.2 Pin description

**Table 2.** Pin description

| Symbol          | Pin | Description    |
|-----------------|-----|----------------|
| 1A              | 1   | data input     |
| 1B              | 2   | data input     |
| 1Y              | 3   | data output    |
| 2A              | 4   | data input     |
| 2B              | 5   | data input     |
| 2Y              | 6   | data output    |
| GND             | 7   | ground (0 V)   |
| 3Y              | 8   | data output    |
| 3A              | 9   | data input     |
| 3B              | 10  | data input     |
| 4Y              | 11  | data output    |
| 4A              | 12  | data input     |
| 4B              | 13  | data input     |
| V <sub>CC</sub> | 14  | supply voltage |

## 6. Functional description

**Table 3.** Function selection<sup>[1]</sup>

| Input |    | Output |
|-------|----|--------|
| nA    | nB | nY     |
| L     | X  | H      |
| X     | L  | H      |
| H     | H  | L      |

[1] H = HIGH voltage level; L = LOW voltage level; X = don't care.

## 7. Limiting values

**Table 4. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

| Symbol    | Parameter               | Conditions                               | Min     | Max  | Unit |
|-----------|-------------------------|------------------------------------------|---------|------|------|
| $V_{CC}$  | supply voltage          |                                          | -0.5    | +7.0 | V    |
| $V_I$     | input voltage           |                                          | -0.5    | +7.0 | V    |
| $I_{IK}$  | input clamping current  | $V_I < -0.5$ V                           | [1] -20 | -    | mA   |
| $I_{OK}$  | output clamping current | $V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V | [1] -20 | +20  | mA   |
| $I_O$     | output current          | $V_O = -0.5$ V to $(V_{CC} + 0.5)$ V     | -25     | +25  | mA   |
| $I_{CC}$  | supply current          |                                          | -       | +75  | mA   |
| $I_{GND}$ | ground current          |                                          | -75     | -    | mA   |
| $T_{stg}$ | storage temperature     |                                          | -65     | +150 | °C   |
| $P_{tot}$ | total power dissipation | $T_{amb} = -40$ °C to +125 °C            | [2] -   | 500  | mW   |

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

[2] For SO14 packages: above 70 °C the value of  $P_{tot}$  derates linearly at 8 mW/K.

For TSSOP14 packages: above 60 °C the value of  $P_{tot}$  derates linearly at 5.5 mW/K.

For DHVQFN14 packages: above 60 °C the value of  $P_{tot}$  derates linearly at 4.5 mW/K.

## 8. Recommended operating conditions

**Table 5. Operating conditions**

| Symbol              | Parameter                           | Conditions                | Min | Typ | Max      | Unit |
|---------------------|-------------------------------------|---------------------------|-----|-----|----------|------|
| <b>74AHC00</b>      |                                     |                           |     |     |          |      |
| $V_{CC}$            | supply voltage                      |                           | 2.0 | 5.0 | 5.5      | V    |
| $V_I$               | input voltage                       |                           | 0   | -   | 5.5      | V    |
| $V_O$               | output voltage                      |                           | 0   | -   | $V_{CC}$ | V    |
| $T_{amb}$           | ambient temperature                 |                           | -40 | +25 | +125     | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 3.0$ V to 3.6 V | -   | -   | 100      | ns/V |
|                     |                                     | $V_{CC} = 4.5$ V to 5.5 V | -   | -   | 20       | ns/V |
| <b>74AHCT00</b>     |                                     |                           |     |     |          |      |
| $V_{CC}$            | supply voltage                      |                           | 4.5 | 5.0 | 5.5      | V    |
| $V_I$               | input voltage                       |                           | 0   | -   | 5.5      | V    |
| $V_O$               | output voltage                      |                           | 0   | -   | $V_{CC}$ | V    |
| $T_{amb}$           | ambient temperature                 |                           | -40 | +25 | +125     | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 4.5$ V to 5.5 V | -   | -   | 20       | ns/V |

## 9. Static characteristics

**Table 6. Static characteristics**

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

| Symbol          | Parameter                 | Conditions                                                                             | 25 °C |     |      | –40 °C to +85 °C |      | –40 °C to +125 °C |      | Unit |
|-----------------|---------------------------|----------------------------------------------------------------------------------------|-------|-----|------|------------------|------|-------------------|------|------|
|                 |                           |                                                                                        | Min   | Typ | Max  | Min              | Max  | Min               | Max  |      |
| 74AHC00         |                           |                                                                                        |       |     |      |                  |      |                   |      |      |
| V <sub>IH</sub> | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V                                                                | 1.5   | -   | -    | 1.5              | -    | 1.5               | -    | V    |
|                 |                           | V <sub>CC</sub> = 3.0 V                                                                | 2.1   | -   | -    | 2.1              | -    | 2.1               | -    | V    |
|                 |                           | V <sub>CC</sub> = 5.5 V                                                                | 3.85  | -   | -    | 3.85             | -    | 3.85              | -    | V    |
| V <sub>IL</sub> | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V                                                                | -     | -   | 0.5  | -                | 0.5  | -                 | 0.5  | V    |
|                 |                           | V <sub>CC</sub> = 3.0 V                                                                | -     | -   | 0.9  | -                | 0.9  | -                 | 0.9  | V    |
|                 |                           | V <sub>CC</sub> = 5.5 V                                                                | -     | -   | 1.65 | -                | 1.65 | -                 | 1.65 | 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> = –50 µA; V <sub>CC</sub> = 2.0 V                                       | 1.9   | 2.0 | -    | 1.9              | -    | 1.9               | -    | V    |
|                 |                           | I <sub>O</sub> = –50 µA; V <sub>CC</sub> = 3.0 V                                       | 2.9   | 3.0 | -    | 2.9              | -    | 2.9               | -    | V    |
|                 |                           | I <sub>O</sub> = –50 µA; V <sub>CC</sub> = 4.5 V                                       | 4.4   | 4.5 | -    | 4.4              | -    | 4.4               | -    | V    |
|                 |                           | I <sub>O</sub> = –4.0 mA; V <sub>CC</sub> = 3.0 V                                      | 2.58  | -   | -    | 2.48             | -    | 2.40              | -    | V    |
|                 |                           | I <sub>O</sub> = –8.0 mA; V <sub>CC</sub> = 4.5 V                                      | 3.94  | -   | -    | 3.80             | -    | 3.70              | -    | V    |
| V <sub>OL</sub> | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                    |       |     |      |                  |      |                   |      |      |
|                 |                           | I <sub>O</sub> = 50 µA; V <sub>CC</sub> = 2.0 V                                        | -     | 0   | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                 |                           | I <sub>O</sub> = 50 µA; V <sub>CC</sub> = 3.0 V                                        | -     | 0   | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                 |                           | I <sub>O</sub> = 50 µA; V <sub>CC</sub> = 4.5 V                                        | -     | 0   | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                 |                           | I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V                                       | -     | -   | 0.36 | -                | 0.44 | -                 | 0.55 | V    |
|                 |                           | I <sub>O</sub> = 8.0 mA; V <sub>CC</sub> = 4.5 V                                       | -     | -   | 0.36 | -                | 0.44 | -                 | 0.55 | V    |
| I <sub>I</sub>  | input leakage current     | V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 0 V to 5.5 V                          | -     | -   | 0.1  | -                | 1.0  | -                 | 2.0  | µA   |
| I <sub>CC</sub> | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V | -     | -   | 2.0  | -                | 20   | -                 | 40   | µA   |
| C <sub>I</sub>  | input capacitance         | V <sub>I</sub> = V <sub>CC</sub> or GND                                                | -     | 3.0 | 10   | -                | 10   | -                 | 10   | pF   |
| 74AHCT00        |                           |                                                                                        |       |     |      |                  |      |                   |      |      |
| V <sub>IH</sub> | HIGH-level input voltage  | V <sub>CC</sub> = 4.5 V to 5.5 V                                                       | 2.0   | -   | -    | 2.0              | -    | 2.0               | -    | V    |
| V <sub>IL</sub> | LOW-level input voltage   | V <sub>CC</sub> = 4.5 V to 5.5 V                                                       | -     | -   | 0.8  | -                | 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> ; V <sub>CC</sub> = 4.5 V          |       |     |      |                  |      |                   |      |      |
|                 |                           | I <sub>O</sub> = –50 µA                                                                | 4.4   | 4.5 | -    | 4.4              | -    | 4.4               | -    | V    |
|                 |                           | I <sub>O</sub> = –8.0 mA                                                               | 3.94  | -   | -    | 3.80             | -    | 3.70              | -    | V    |
| V <sub>OL</sub> | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V          |       |     |      |                  |      |                   |      |      |
|                 |                           | I <sub>O</sub> = 50 µA                                                                 | -     | 0   | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                 |                           | I <sub>O</sub> = 8.0 mA                                                                | -     | -   | 0.36 | -                | 0.44 | -                 | 0.55 | V    |
| I <sub>I</sub>  | input leakage current     | V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 0 V to 5.5 V                          | -     | -   | 0.1  | -                | 1.0  | -                 | 2.0  | µA   |

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

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

| Symbol          | Parameter                 | Conditions                                                                                                            | 25 °C |     |      | –40 °C to +85 °C |     | –40 °C to +125 °C |     | Unit    |
|-----------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------|-------|-----|------|------------------|-----|-------------------|-----|---------|
|                 |                           |                                                                                                                       | Min   | Typ | Max  | Min              | Max | Min               | Max |         |
| $I_{CC}$        | supply current            | $V_I = V_{CC}$ or GND; $I_O = 0$ A;<br>$V_{CC} = 5.5$ V                                                               | -     | -   | 2.0  | -                | 20  | -                 | 40  | $\mu$ A |
| $\Delta I_{CC}$ | additional supply current | per input pin;<br>$V_I = V_{CC} - 2.1$ V;<br>other pins at $V_{CC}$ or GND;<br>$I_O = 0$ A; $V_{CC} = 4.5$ V to 5.5 V | -     | -   | 1.35 | -                | 1.5 | -                 | 1.5 | mA      |
| $C_I$           | input capacitance         | $V_I = V_{CC}$ or GND                                                                                                 | -     | 3.0 | 10   | -                | 10  | -                 | 10  | pF      |

## 10. Dynamic characteristics

**Table 7.** Dynamic characteristicsVoltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#).

| Symbol | Parameter | Conditions | 25 °C |                    |     | –40 °C to +85 °C |     | –40 °C to +125 °C |     | Unit |
|--------|-----------|------------|-------|--------------------|-----|------------------|-----|-------------------|-----|------|
|        |           |            | Min   | Typ <sup>[1]</sup> | Max | Min              | Max | Min               | Max |      |

### 74AHC00

|          |                               |                                                           |   |     |      |     |      |     |      |    |
|----------|-------------------------------|-----------------------------------------------------------|---|-----|------|-----|------|-----|------|----|
| $t_{pd}$ | propagation delay             | nA, nB to nY; see <a href="#">Figure 6</a> <sup>[2]</sup> |   |     |      |     |      |     |      |    |
|          |                               | $V_{CC} = 3.0$ V to 3.6 V                                 |   |     |      |     |      |     |      |    |
|          |                               | $C_L = 15$ pF                                             | - | 4.5 | 7.9  | 1.0 | 9.5  | 1.0 | 10.0 | ns |
|          |                               | $C_L = 50$ pF                                             | - | 6.0 | 11.4 | 1.0 | 13.0 | 1.0 | 14.5 | ns |
|          |                               | $V_{CC} = 4.5$ V to 5.5 V                                 |   |     |      |     |      |     |      |    |
|          |                               | $C_L = 15$ pF                                             | - | 3.2 | 5.5  | 1.0 | 6.5  | 1.0 | 7.0  | ns |
| $C_{PD}$ | power dissipation capacitance | $C_L = 50$ pF; $f_i = 1$ MHz; <sup>[3]</sup>              | - | 7.0 | -    | -   | -    | -   | -    | pF |
|          |                               | $V_I = \text{GND to } V_{CC}$                             |   |     |      |     |      |     |      |    |

### 74AHCT00

|          |                               |                                                           |   |     |     |     |     |     |      |    |
|----------|-------------------------------|-----------------------------------------------------------|---|-----|-----|-----|-----|-----|------|----|
| $t_{pd}$ | propagation delay             | nA, nB to nY; see <a href="#">Figure 6</a> <sup>[2]</sup> |   |     |     |     |     |     |      |    |
|          |                               | $V_{CC} = 4.5$ V to 5.5 V                                 |   |     |     |     |     |     |      |    |
|          |                               | $C_L = 15$ pF                                             | - | 3.3 | 6.9 | 1.0 | 8.0 | 1.0 | 9.0  | ns |
|          |                               | $C_L = 50$ pF                                             | - | 4.5 | 7.9 | 1.0 | 9.0 | 1.0 | 10.0 | ns |
| $C_{PD}$ | power dissipation capacitance | $C_L = 50$ pF; $f_i = 1$ MHz; <sup>[3]</sup>              | - | 7.0 | -   | -   | -   | -   | -    | pF |
|          |                               | $V_I = \text{GND to } V_{CC}$                             |   |     |     |     |     |     |      |    |

[1] Typical values are measured at nominal supply voltage ( $V_{CC} = 3.3$  V and  $V_{CC} = 5.0$  V).[2]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .[3]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu$ W). $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$  where: $f_i$  = input frequency in MHz; $f_o$  = output frequency in MHz; $C_L$  = output load capacitance in pF; $V_{CC}$  = supply voltage in V; $N$  = number of inputs switching; $\Sigma(C_L \times V_{CC}^2 \times f_o)$  = sum of the outputs.

11. Waveforms

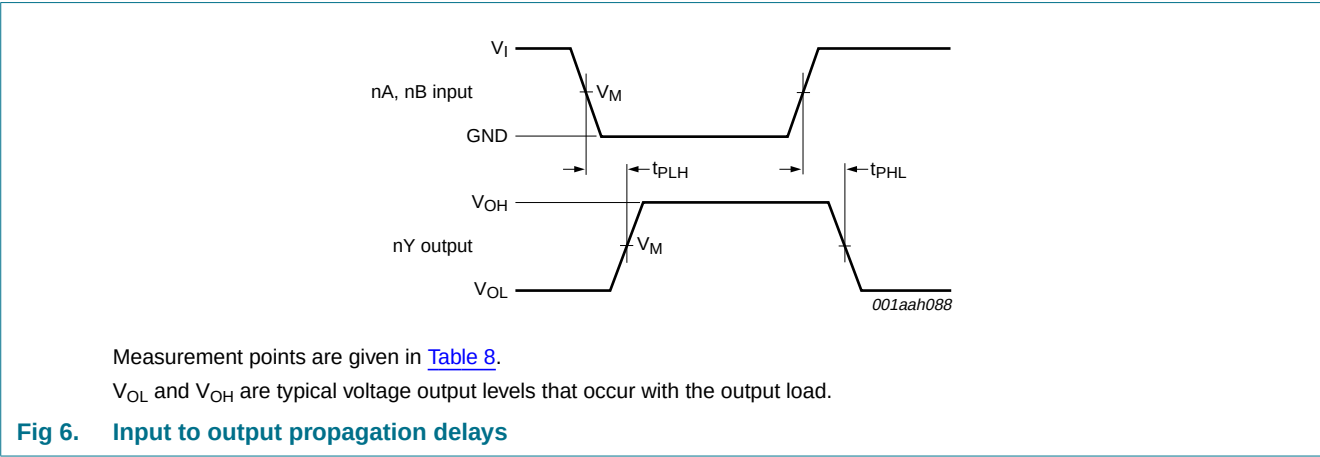


Table 8. Measurement points

| Type     | Input               | Output              |
|----------|---------------------|---------------------|
|          | $V_M$               | $V_M$               |
| 74AHC00  | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ |
| 74AHCT00 | 1.5 V               | $0.5 \times V_{CC}$ |

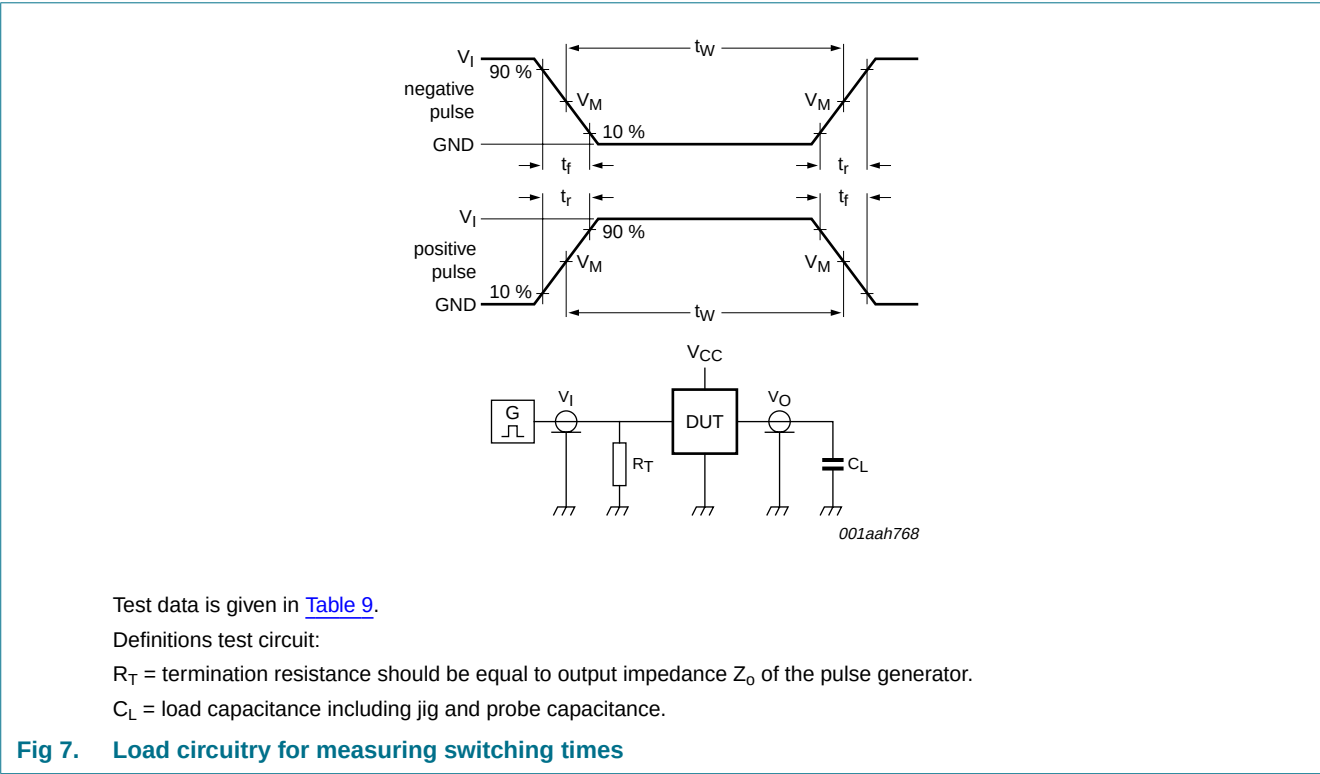


Table 9. Test data

| Type     | Input           |                                 | Load           | Test                                |
|----------|-----------------|---------------------------------|----------------|-------------------------------------|
|          | V <sub>I</sub>  | t <sub>r</sub> , t <sub>f</sub> | C <sub>L</sub> |                                     |
| 74AHC00  | V <sub>CC</sub> | ≤ 3.0 ns                        | 15 pF, 50 pF   | t <sub>PLH</sub> , t <sub>PHL</sub> |
| 74AHCT00 | 3.0 V           | ≤ 3.0 ns                        | 15 pF, 50 pF   | t <sub>PLH</sub> , t <sub>PHL</sub> |



12. Package outline

SO14: plastic small outline package; 14 leads; body width 3.9 mm SOT108-1

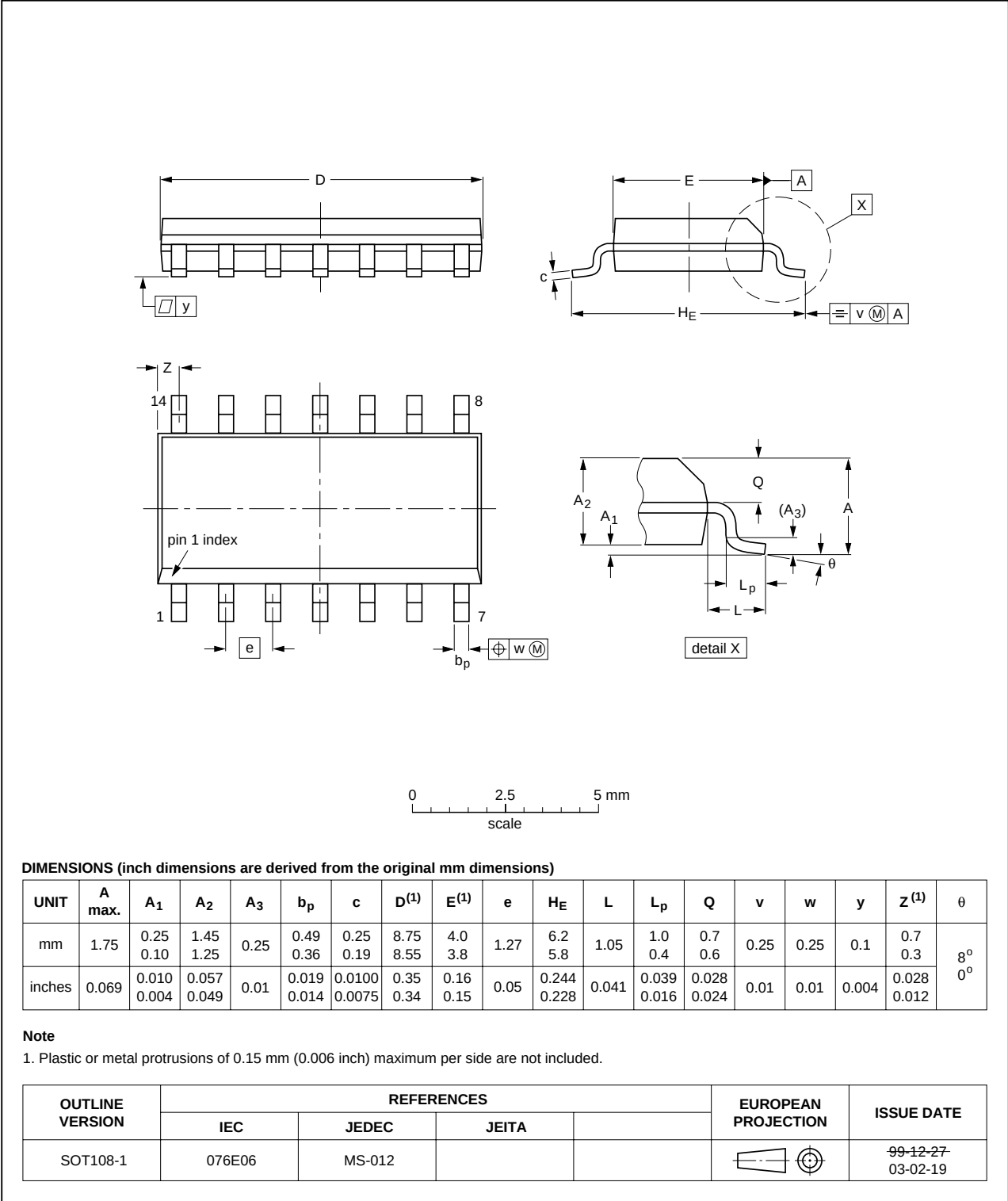


Fig 8. Package outline SOT108-1 (SO14)

TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm

SOT402-1

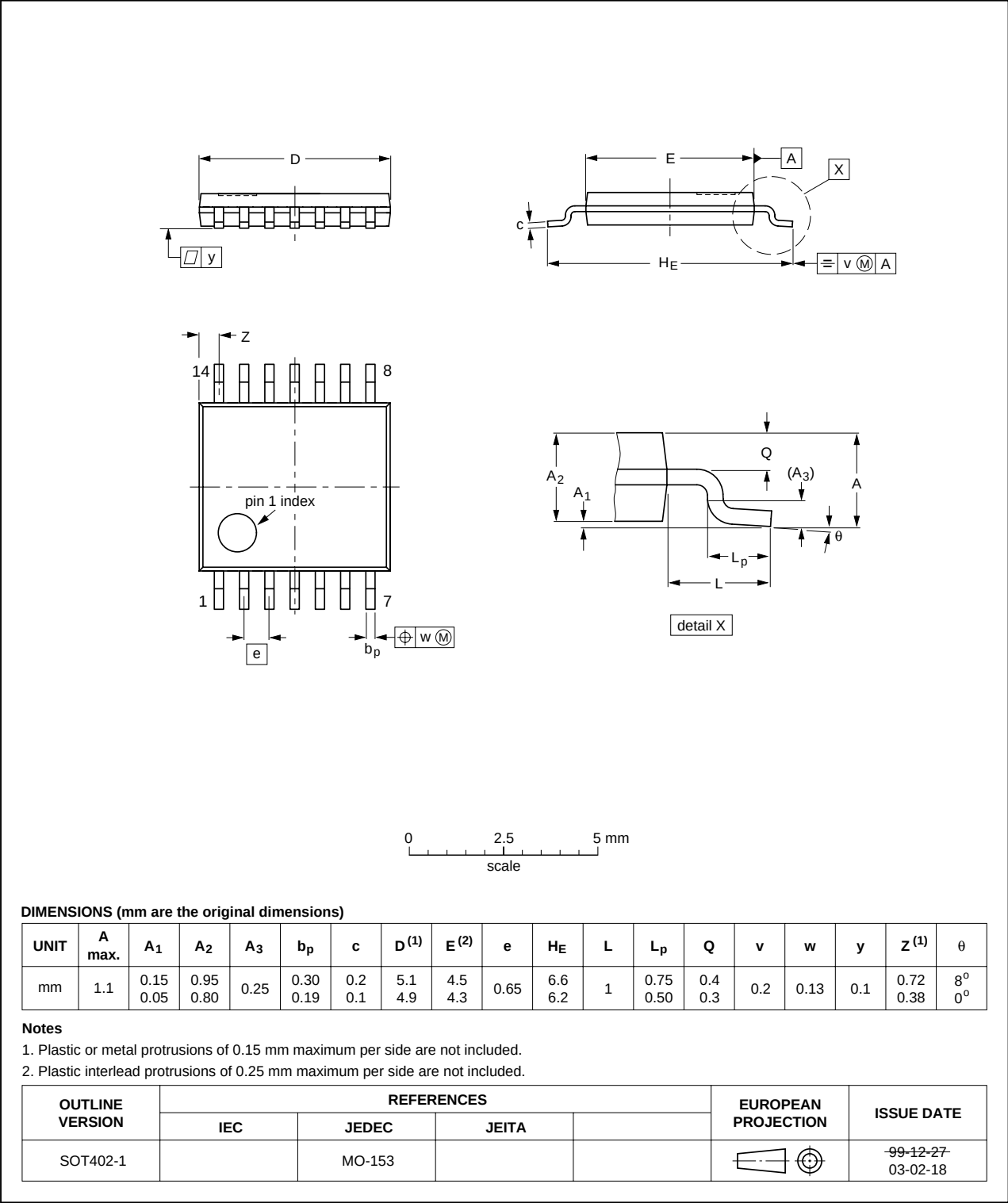


Fig 9. Package outline SOT402-1 (TSSOP14)

DHVQFN14: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 x 3 x 0.85 mm

SOT762-1

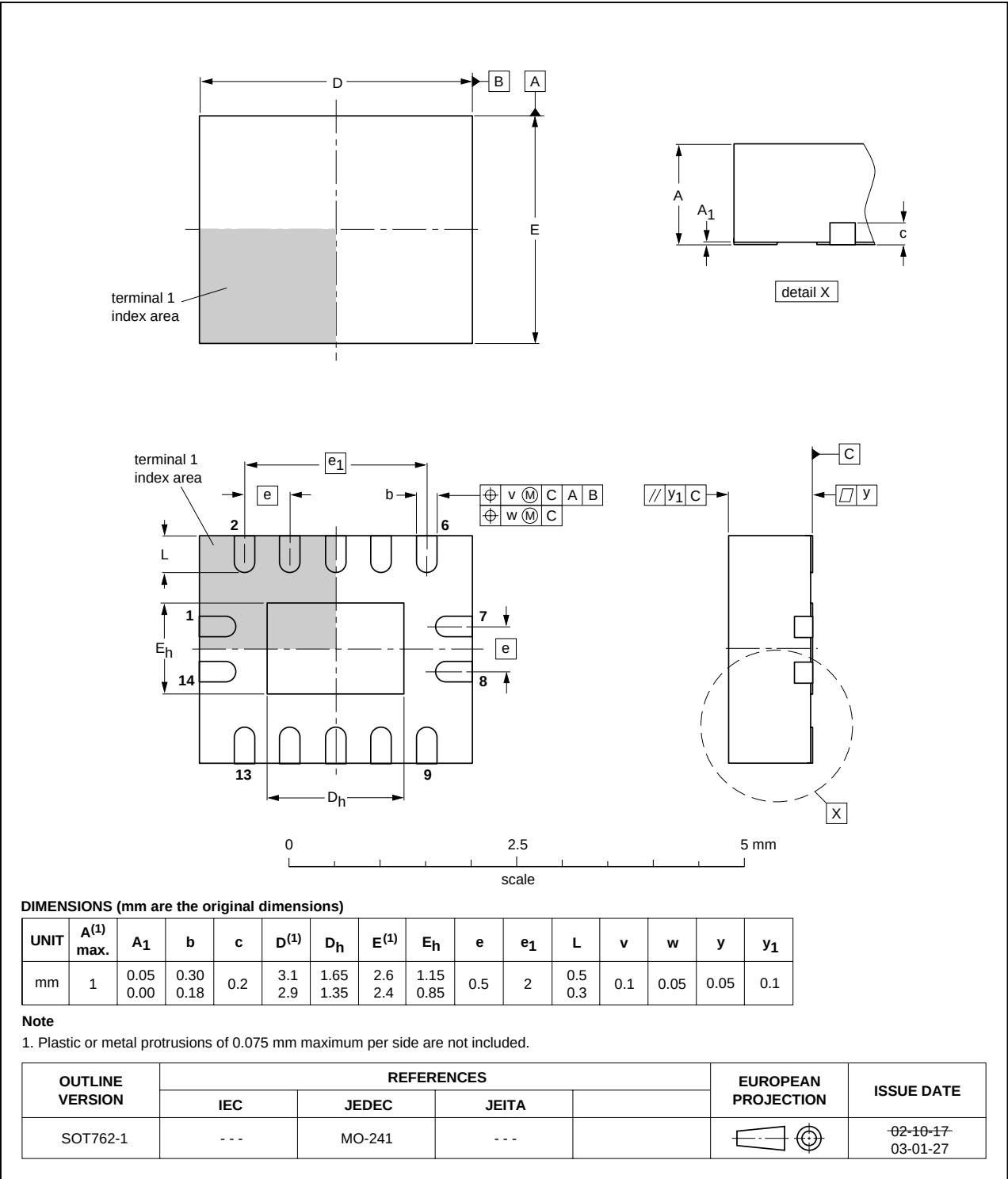


Fig 10. Package outline SOT762-1 (DHVQFN14)

## 13. Abbreviations

Table 10. Abbreviations

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

## 14. Revision history

Table 11. Revision history

| Document ID    | Release date | Data sheet status                                                                       | Change notice | Supersedes     |
|----------------|--------------|-----------------------------------------------------------------------------------------|---------------|----------------|
| 74AHC_AHCT00_4 | 20080428     | Product data sheet                                                                      | -             | 74AHC_AHCT00_3 |
| Modifications: |              | • <a href="#">Table 6</a> : the conditions for input leakage current have been changed. |               |                |
| 74AHC_AHCT00_3 | 20080108     | Product data sheet                                                                      | -             | 74AHC_AHCT00_2 |
| 74AHC_AHCT00_2 | 19990923     | Product specification                                                                   | -             | 74AHC_AHCT00_1 |
| 74AHC_AHCT00_1 | 19981209     | Product specification                                                                   | -             | -              |

## 15. Legal information

### 15.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | Definition                                                                            |
|-----------------------------------|-------------------------------|---------------------------------------------------------------------------------------|
| Objective [short] data sheet      | Development                   | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet    | Qualification                 | This document contains data from the preliminary specification.                       |
| Product [short] data sheet        | Production                    | This document contains the product specification.                                     |

[1] Please consult the most recently issued document before initiating or completing a design.

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

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

### 15.2 Definitions

**Draft** — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet** — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

### 15.3 Disclaimers

**General** — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

**Right to make changes** — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use** — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or

malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications** — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

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

**Terms and conditions of sale** — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

**No offer to sell or license** — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

### 15.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

## 16. Contact information

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

17. Contents

1 General description . . . . . 1

2 Features . . . . . 1

3 Ordering information . . . . . 1

4 Functional diagram . . . . . 2

5 Pinning information . . . . . 2

5.1 Pinning . . . . . 2

5.2 Pin description . . . . . 3

6 Functional description . . . . . 3

7 Limiting values . . . . . 4

8 Recommended operating conditions . . . . . 4

9 Static characteristics . . . . . 5

10 Dynamic characteristics . . . . . 6

11 Waveforms . . . . . 7

12 Package outline . . . . . 9

13 Abbreviations . . . . . 12

14 Revision history . . . . . 12

15 Legal information . . . . . 13

15.1 Data sheet status . . . . . 13

15.2 Definitions . . . . . 13

15.3 Disclaimers . . . . . 13

15.4 Trademarks . . . . . 13

16 Contact information . . . . . 13

17 Contents . . . . . 14



Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.