

# 74HC574; 74HCT574

Octal D-type flip-flop; positive edge-trigger; 3-state

Rev. 5 — 25 April 2012

Product data sheet

## 1. General description

The 74HC574; 74HCT574 is a high-speed Si-gate CMOS device and is pin compatible with Low-power Schottky TTL. It is specified in compliance with JEDEC standard no. 7A.

The 74HC574; 74HCT574 are octal D-type flip-flops featuring separate D-type inputs for each flip-flop and 3-state outputs for bus-oriented applications. A clock (CP) and an output enable ( $\overline{OE}$ ) input are common to all flip-flops. The 8 flip-flops will store the state of their individual D-inputs that meet the set-up and hold times requirements on the LOW-to-HIGH CP transition. When  $\overline{OE}$  is LOW the contents of the 8 flip-flops are available at the outputs. When  $\overline{OE}$  is HIGH, the outputs go to the high-impedance OFF-state. Operation of the  $\overline{OE}$  input does not affect the state of the flip-flops.

The 74HC574; 74HCT574 is functionally identical to:

- 74HC564: but has non-inverting outputs
- 74HC374; 74HCT374: but has a different pin arrangement

## 2. Features and benefits

- 3-state non-inverting outputs for bus oriented applications
- 8-bit positive, edge-triggered register
- Common 3-state output enable input
- ESD protection:
  - ◆ HBM JESD22-A114F exceeds 2 000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$

## 3. Ordering information

Table 1. Ordering information

| Type number | Package                                                         |       |                                                  |          |
|-------------|-----------------------------------------------------------------|-------|--------------------------------------------------|----------|
|             | Temperature range                                               | Name  | Description                                      | Version  |
| 74HC574N    | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | DIP20 | plastic dual in-line package; 20 leads (300 mil) | SOT146-1 |
| 74HCT574N   |                                                                 |       |                                                  |          |
| 74HC574D    | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | SO20  | plastic small outline package; 20 leads;         | SOT163-1 |
| 74HCT574D   |                                                                 |       | body width 7.5 mm                                |          |



Table 1. Ordering information ...continued

| Type number             | Package           |         |                                                                           |          |
|-------------------------|-------------------|---------|---------------------------------------------------------------------------|----------|
|                         | Temperature range | Name    | Description                                                               | Version  |
| 74HC574DB<br>74HCT574DB | −40 °C to +125 °C | SSOP20  | plastic shrink small outline package; 20 leads;<br>body width 5.3 mm      | SOT339-1 |
| 74HC574PW<br>74HCT574PW | −40 °C to +125 °C | TSSOP20 | plastic thin shrink small outline package; 20 leads;<br>body width 4.4 mm | SOT360-1 |

4. Functional diagram

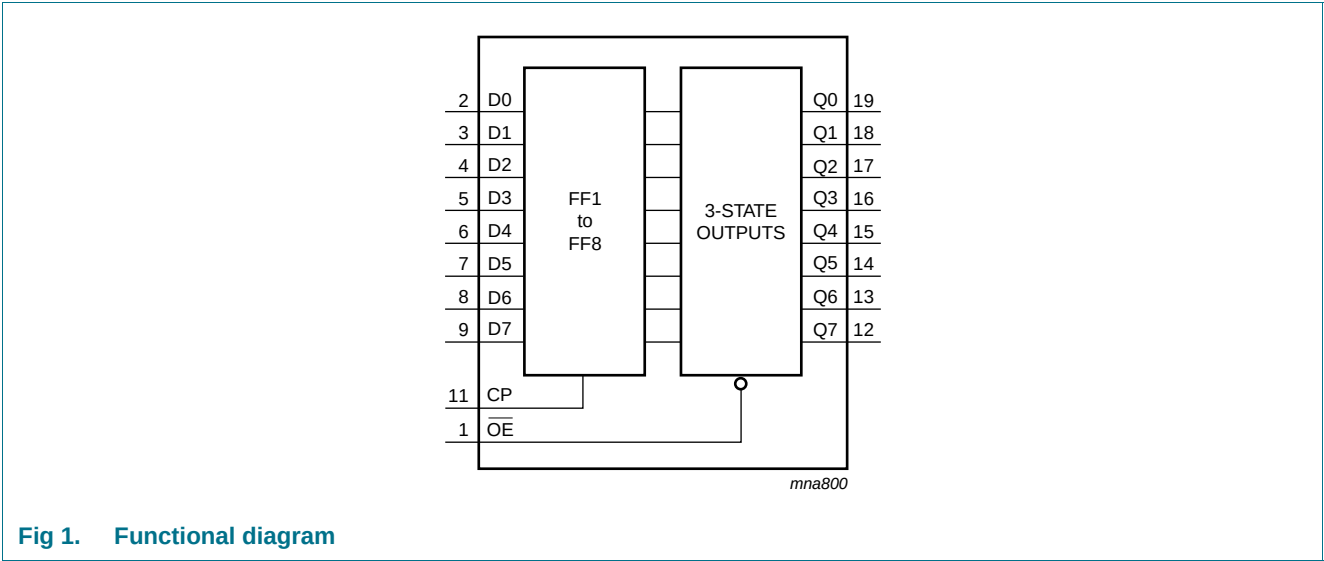


Fig 1. Functional diagram

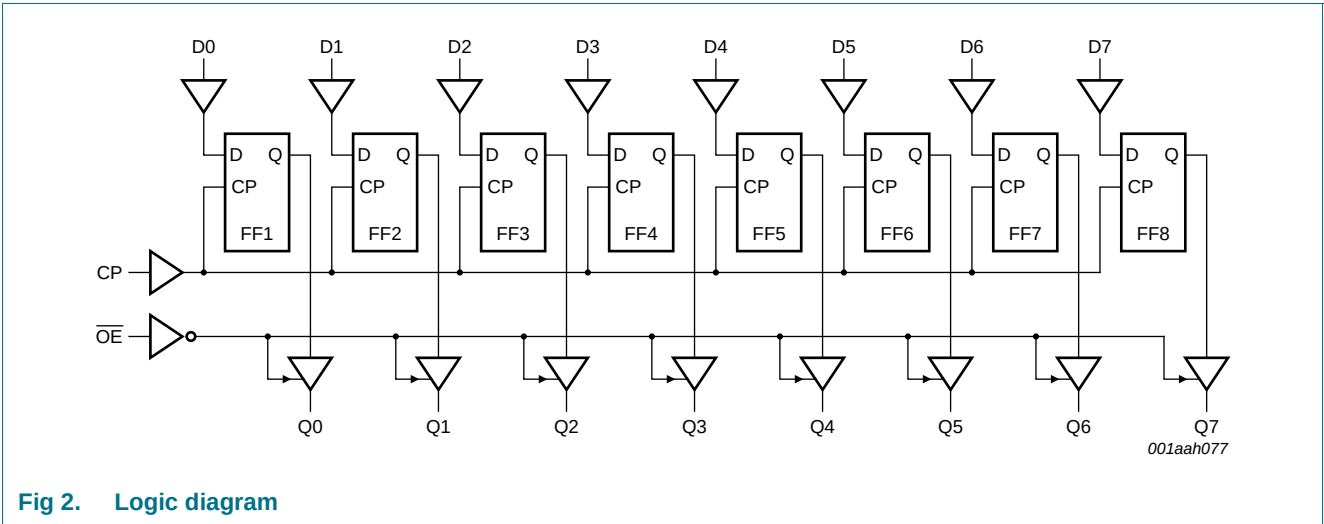


Fig 2. Logic diagram

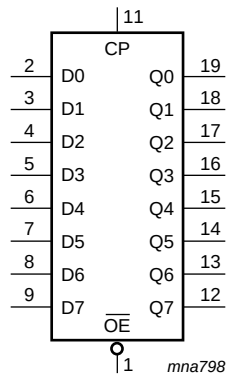


Fig 3. Logic symbol

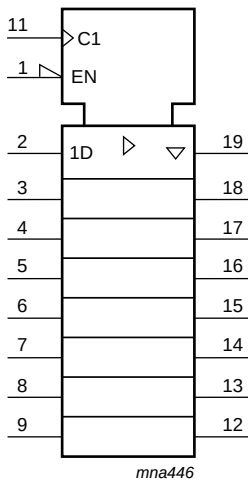


Fig 4. IEC logic symbol

5. Pinning information

5.1 Pinning

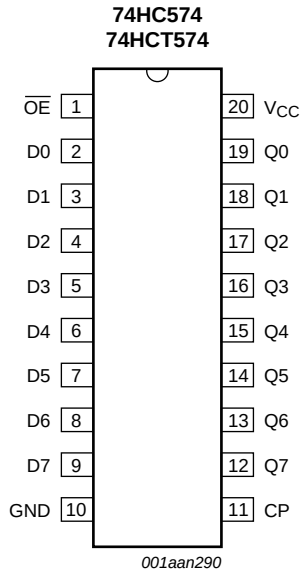


Fig 5. Pin configuration DIP20 and SO20

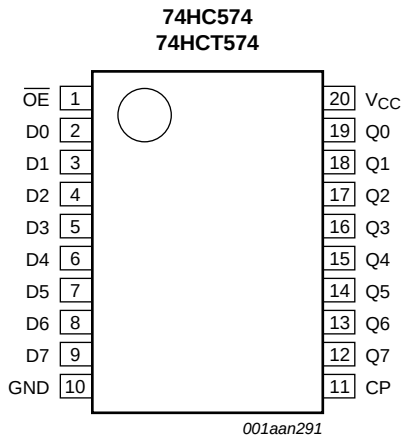


Fig 6. Pin configuration SSOP20 and TSSOP20

## 5.2 Pin description

**Table 2.** Pin description

| Symbol          | Pin                            | Description                               |
|-----------------|--------------------------------|-------------------------------------------|
| $\overline{OE}$ | 1                              | 3-state output enable input (active LOW)  |
| D[0:7]          | 2, 3, 4, 5, 6, 7, 8, 9         | data input                                |
| GND             | 10                             | ground (0 V)                              |
| CP              | 11                             | clock input (LOW-to-HIGH, edge triggered) |
| Q[0:7]          | 19, 18, 17, 16, 15, 14, 13, 12 | 3-state flip-flop output                  |
| V <sub>CC</sub> | 20                             | supply voltage                            |

## 6. Functional description

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

| Operating mode                   | Input |    |    | Internal flip-flop | Output Qn |
|----------------------------------|-------|----|----|--------------------|-----------|
|                                  | OE    | CP | Dn |                    |           |
| Load and read register           | L     | ↑  | l  | L                  | L         |
|                                  | L     | ↑  | h  | H                  | H         |
| Load register and disable output | H     | ↑  | l  | L                  | Z         |
|                                  | H     | ↑  | h  | H                  | Z         |

- [1] H = HIGH voltage level;  
 h = HIGH voltage level one setup time prior to the HIGH-to-LOW CP transition;  
 L = LOW voltage level;  
 l = LOW voltage level one setup time prior to the HIGH-to-LOW CP transition;  
 Z = high-impedance OFF-state;  
 ↑ = LOW-to-HIGH clock transition.

## 7. Limiting values

**Table 4.** Limiting values

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

| Symbol           | Parameter               | Conditions                                                          | Min              | Max  | Unit |
|------------------|-------------------------|---------------------------------------------------------------------|------------------|------|------|
| V <sub>CC</sub>  | supply voltage          |                                                                     | -0.5             | +7   | V    |
| I <sub>IK</sub>  | input clamping current  | V <sub>I</sub> < -0.5 V or V <sub>I</sub> > V <sub>CC</sub> + 0.5 V | -                | ±20  | mA   |
| I <sub>OK</sub>  | output clamping current | V <sub>O</sub> < -0.5 V or V <sub>O</sub> > V <sub>CC</sub> + 0.5 V | -                | ±20  | mA   |
| I <sub>O</sub>   | output current          | V <sub>O</sub> = -0.5 V to (V <sub>CC</sub> + 0.5 V)                | -                | ±35  | mA   |
| I <sub>CC</sub>  | supply current          |                                                                     | -                | +70  | mA   |
| I <sub>GND</sub> | ground current          |                                                                     | -                | -70  | mA   |
| T <sub>stg</sub> | storage temperature     |                                                                     | -65              | +150 | °C   |
| P <sub>tot</sub> | total power dissipation | DIP20 package                                                       | <sup>[1]</sup> - | 750  | mW   |
|                  |                         | SO20, SSOP20 and TSSOP20 packages                                   | <sup>[2]</sup> - | 500  | mW   |

- [1] For DIP20 package: P<sub>tot</sub> derates linearly with 12 mW/K above 70 °C.  
 [2] For SO20: P<sub>tot</sub> derates linearly with 8 mW/K above 70 °C.  
 For SSOP20 and TSSOP20 packages: P<sub>tot</sub> derates linearly with 5.5 mW/K above 60 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

Voltages are referenced to GND (ground = 0 V)

| Symbol              | Parameter                           | Conditions              | 74HC574 |      |                 | 74HCT574 |      |                 | Unit |
|---------------------|-------------------------------------|-------------------------|---------|------|-----------------|----------|------|-----------------|------|
|                     |                                     |                         | Min     | Typ  | Max             | Min      | Typ  | Max             |      |
| V <sub>CC</sub>     | supply voltage                      |                         | 2.0     | 5.0  | 6.0             | 4.5      | 5.0  | 5.5             | V    |
| V <sub>I</sub>      | input voltage                       |                         | 0       | -    | V <sub>CC</sub> | 0        | -    | V <sub>CC</sub> | V    |
| V <sub>O</sub>      | output voltage                      |                         | 0       | -    | V <sub>CC</sub> | 0        | -    | V <sub>CC</sub> | V    |
| T <sub>amb</sub>    | ambient temperature                 |                         | -40     | +25  | +125            | -40      | +25  | +125            | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | V <sub>CC</sub> = 2.0 V | -       | -    | 625             | -        | -    | -               | ns/V |
|                     |                                     | V <sub>CC</sub> = 4.5 V | -       | 1.67 | 139             | -        | 1.67 | 139             | ns/V |
|                     |                                     | V <sub>CC</sub> = 6.0 V | -       | -    | 83              | -        | -    | -               | 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   |      |
| 74HC574         |                           |                                                                                                                              |       |      |      |                  |      |                   |       |      |
| V <sub>IH</sub> | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V                                                                                                      | 1.5   | 1.2  | -    | 1.5              | -    | 1.5               | -     | V    |
|                 |                           | V <sub>CC</sub> = 4.5 V                                                                                                      | 3.15  | 2.4  | -    | 3.15             | -    | 3.15              | -     | V    |
|                 |                           | V <sub>CC</sub> = 6.0 V                                                                                                      | 4.2   | 3.2  | -    | 4.2              | -    | 4.2               | -     | V    |
| V <sub>IL</sub> | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V                                                                                                      | -     | 0.8  | 0.5  | -                | 0.5  | -                 | 0.5   | V    |
|                 |                           | V <sub>CC</sub> = 4.5 V                                                                                                      | -     | 2.1  | 1.35 | -                | 1.35 | -                 | 1.35  | V    |
|                 |                           | V <sub>CC</sub> = 6.0 V                                                                                                      | -     | 2.8  | 1.8  | -                | 1.8  | -                 | 1.8   | V    |
| V <sub>OH</sub> | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                                                          |       |      |      |                  |      |                   |       |      |
|                 |                           | I <sub>O</sub> = −20 μA; V <sub>CC</sub> = 2.0 V                                                                             | 1.9   | 2.0  | -    | 1.9              | -    | 1.9               | -     | V    |
|                 |                           | I <sub>O</sub> = −20 μA; V <sub>CC</sub> = 4.5 V                                                                             | 4.4   | 4.5  | -    | 4.4              | -    | 4.4               | -     | V    |
|                 |                           | I <sub>O</sub> = −20 μA; V <sub>CC</sub> = 6.0 V                                                                             | 5.9   | 6.0  | -    | 5.9              | -    | 5.9               | -     | V    |
|                 |                           | I <sub>O</sub> = −6.0 mA; V <sub>CC</sub> = 4.5 V                                                                            | 3.98  | 4.32 | -    | 3.84             | -    | 3.7               | -     | V    |
|                 |                           | I <sub>O</sub> = −7.8 mA; V <sub>CC</sub> = 6.0 V                                                                            | 5.48  | 5.81 | -    | 5.34             | -    | 5.2               | -     | V    |
| V <sub>OL</sub> | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                                                          |       |      |      |                  |      |                   |       |      |
|                 |                           | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 2.0 V                                                                              | -     | 0    | 0.1  | -                | 0.1  | -                 | 0.1   | V    |
|                 |                           | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 4.5 V                                                                              | -     | 0    | 0.1  | -                | 0.1  | -                 | 0.1   | V    |
|                 |                           | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 6.0 V                                                                              | -     | 0    | 0.1  | -                | 0.1  | -                 | 0.1   | V    |
|                 |                           | I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V                                                                             | -     | 0.15 | 0.26 | -                | 0.33 | -                 | 0.4   | V    |
|                 |                           | I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V                                                                             | -     | 0.16 | 0.26 | -                | 0.33 | -                 | 0.4   | V    |
| I <sub>I</sub>  | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 6.0 V                                                          | -     | -    | ±0.1 | -                | ±1.0 | -                 | ±1.0  | μA   |
| I <sub>OZ</sub> | OFF-state output current  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;<br>V <sub>O</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 6.0 V | -     | -    | ±0.5 | -                | ±5.0 | -                 | ±10.0 | 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>$V_{CC} = 6.0$ V                                                                                | -     | -    | 8.0       | -                | 80        | -                 | 160       | $\mu$ A |
| $C_I$           | input capacitance         |                                                                                                                                        | -     | 3.5  | -         |                  |           |                   |           | pF      |
| <b>74HCT574</b> |                           |                                                                                                                                        |       |      |           |                  |           |                   |           |         |
| $V_{IH}$        | HIGH-level input voltage  | $V_{CC} = 4.5$ V to $5.5$ V                                                                                                            | 2.0   | 1.6  | -         | 2.0              | -         | 2.0               | -         | V       |
| $V_{IL}$        | LOW-level input voltage   | $V_{CC} = 4.5$ V to $5.5$ V                                                                                                            | -     | 1.2  | 0.8       | -                | 0.8       | -                 | 0.8       | V       |
| $V_{OH}$        | HIGH-level output voltage | $V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 4.5$ V                                                                                          |       |      |           |                  |           |                   |           |         |
|                 |                           | $I_O = -20$ $\mu$ A                                                                                                                    | 4.4   | 4.5  | -         | 4.4              | -         | 4.4               | -         | V       |
|                 |                           | $I_O = -6$ mA                                                                                                                          | 3.98  | 4.32 | -         | 3.84             | -         | 3.7               | -         | V       |
| $V_{OL}$        | LOW-level output voltage  | $V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 4.5$ V                                                                                          |       |      |           |                  |           |                   |           |         |
|                 |                           | $I_O = 20$ $\mu$ A                                                                                                                     | -     | 0    | 0.1       | -                | 0.1       | -                 | 0.1       | V       |
|                 |                           | $I_O = 6.0$ mA                                                                                                                         | -     | 0.16 | 0.26      | -                | 0.33      | -                 | 0.4       | V       |
| $I_I$           | input leakage current     | $V_I = V_{CC}$ or GND;<br>$V_{CC} = 5.5$ V                                                                                             | -     | -    | $\pm 0.1$ | -                | $\pm 1.0$ | -                 | $\pm 1.0$ | $\mu$ A |
| $I_{OZ}$        | OFF-state output current  | $V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 5.5$ V;<br>$V_O = V_{CC}$ or GND per input pin;<br>other inputs at $V_{CC}$ or GND; $I_O = 0$ A | -     | -    | $\pm 0.5$ | -                | $\pm 5.0$ | -                 | $\pm 10$  | $\mu$ A |
| $I_{CC}$        | supply current            | $V_I = V_{CC}$ or GND; $I_O = 0$ A;<br>$V_{CC} = 5.5$ V                                                                                | -     | -    | 8.0       | -                | 80        | -                 | 160       | $\mu$ A |
| $\Delta I_{CC}$ | additional supply current | $V_I = V_{CC} - 2.1$ V;<br>other inputs at $V_{CC}$ or GND;<br>$V_{CC} = 4.5$ V to $5.5$ V;<br>$I_O = 0$ A                             |       |      |           |                  |           |                   |           |         |
|                 |                           | per input pin; Dn inputs                                                                                                               | -     | 50   | 180       | -                | 225       | -                 | 245       | $\mu$ A |
|                 |                           | per input pin; $\overline{OE}$ input                                                                                                   | -     | 125  | 450       | -                | 563       | -                 | 613       | $\mu$ A |
|                 |                           | per input pin; CP input                                                                                                                | -     | 150  | 540       | -                | 675       | -                 | 735       | $\mu$ A |
| $C_I$           | input capacitance         |                                                                                                                                        | -     | 3.5  | -         |                  |           |                   |           | pF      |

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; for test circuit see [Figure 10](#).

| Symbol           | Parameter         | Conditions                                            | 25 °C |     |     | –40 °C to +85 °C |     | –40 °C to +125 °C |     | Unit |
|------------------|-------------------|-------------------------------------------------------|-------|-----|-----|------------------|-----|-------------------|-----|------|
|                  |                   |                                                       | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| For type 74HC574 |                   |                                                       |       |     |     |                  |     |                   |     |      |
| t <sub>pd</sub>  | propagation delay | CP to Qn; see <a href="#">Figure 7</a> <sup>[1]</sup> |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                               | -     | 47  | 150 | -                | 190 | -                 | 225 | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                               | -     | 17  | 30  | -                | 35  | -                 | 45  | ns   |
|                  |                   | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF         | -     | 14  | -   | -                | -   | -                 | -   | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                               | -     | 14  | 26  | -                | 33  | -                 | 38  | ns   |
| t <sub>en</sub>  | enable time       | OE to Qn; see <a href="#">Figure 9</a> <sup>[2]</sup> |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                               | -     | 44  | 140 | -                | 175 | -                 | 210 | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                               | -     | 16  | 28  | -                | 35  | -                 | 42  | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                               | -     | 13  | 24  | -                | 30  | -                 | 36  | ns   |
| t <sub>dis</sub> | disable time      | OE to Qn; see <a href="#">Figure 9</a> <sup>[3]</sup> |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                               | -     | 39  | 125 | -                | 155 | -                 | 190 | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                               | -     | 14  | 25  | -                | 31  | -                 | 38  | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                               | -     | 11  | 21  | -                | 26  | -                 | 32  | ns   |
| t <sub>t</sub>   | transition time   | Qn; see <a href="#">Figure 7</a> <sup>[4]</sup>       |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                               | -     | 14  | 60  | -                | 75  | -                 | 90  | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                               | -     | 5   | 12  | -                | 15  | -                 | 18  | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                               | -     | 4   | 10  | -                | 13  | -                 | 15  | ns   |
| t <sub>w</sub>   | pulse width       | CP HIGH or LOW; see <a href="#">Figure 8</a>          |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                               | 80    | 14  | -   | 100              | -   | 120               | -   | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                               | 16    | 5   | -   | 20               | -   | 24                | -   | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                               | 14    | 4   | -   | 17               | -   | 20                | -   | ns   |
| t <sub>su</sub>  | set-up time       | Dn to CP; see <a href="#">Figure 8</a>                |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                               | 60    | 6   | -   | 75               | -   | 90                | -   | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                               | 12    | 2   | -   | 15               | -   | 18                | -   | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                               | 10    | 2   | -   | 13               | -   | 15                | -   | ns   |
| t <sub>h</sub>   | hold time         | Dn to CP; see <a href="#">Figure 8</a>                |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                               | 5     | 0   | -   | 5                | -   | 5                 | -   | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                               | 5     | 0   | -   | 5                | -   | 5                 | -   | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                               | 5     | 0   | -   | 5                | -   | 5                 | -   | ns   |
| f <sub>max</sub> | maximum frequency | CP; see <a href="#">Figure 7</a>                      |       |     |     |                  |     |                   |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                               | 6.0   | 37  | -   | 4.8              | -   | 4.0               | -   | MHz  |
|                  |                   | V <sub>CC</sub> = 4.5 V                               | 30    | 112 | -   | 24               | -   | 20                | -   | MHz  |
|                  |                   | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF         | -     | 123 | -   | -                | -   | -                 | -   | MHz  |
|                  |                   | V <sub>CC</sub> = 6.0 V                               | 35    | 133 | -   | 28               | -   | 24                | -   | MHz  |

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

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; for test circuit see [Figure 10](#).

| Symbol                   | Parameter                     | Conditions                                                   | 25 °C |     |     | –40 °C to +85 °C |     | –40 °C to +125 °C |     | Unit |
|--------------------------|-------------------------------|--------------------------------------------------------------|-------|-----|-----|------------------|-----|-------------------|-----|------|
|                          |                               |                                                              | Min   | Typ | Max | Min              | Max | Min               | Max |      |
| $C_{PD}$                 | power dissipation capacitance | $C_L = 50$ pF; $f = 1$ MHz;<br>$V_I = \text{GND to } V_{CC}$ | [5]   | -   | 22  | -                | -   | -                 | -   | pF   |
| <b>For type 74HCT574</b> |                               |                                                              |       |     |     |                  |     |                   |     |      |
| $t_{pd}$                 | propagation delay             | CP to Qn; see <a href="#">Figure 7</a>                       | [1]   |     |     |                  |     |                   |     |      |
|                          |                               | $V_{CC} = 4.5$ V                                             | -     | 18  | 33  | -                | 41  | -                 | 50  | ns   |
|                          |                               | $V_{CC} = 5$ V; $C_L = 15$ pF                                | -     | 15  | -   | -                | -   | -                 | -   | ns   |
| $t_{en}$                 | enable time                   | OE to Qn; see <a href="#">Figure 9</a>                       | [2]   |     |     |                  |     |                   |     |      |
|                          |                               | $V_{CC} = 4.5$ V                                             | -     | 19  | 33  | -                | 41  | -                 | 50  | ns   |
| $t_{dis}$                | disable time                  | OE to Qn; see <a href="#">Figure 9</a>                       | [3]   |     |     |                  |     |                   |     |      |
|                          |                               | $V_{CC} = 4.5$ V                                             | -     | 16  | 28  | -                | 35  | -                 | 42  | ns   |
| $t_t$                    | transition time               | Qn; see <a href="#">Figure 7</a>                             | [4]   |     |     |                  |     |                   |     |      |
|                          |                               | $V_{CC} = 4.5$ V                                             | -     | 5   | 12  | -                | 15  | -                 | 18  | ns   |
| $t_W$                    | pulse width                   | CP HIGH or LOW;<br>see <a href="#">Figure 8</a>              |       |     |     |                  |     |                   |     |      |
|                          |                               | $V_{CC} = 4.5$ V                                             | 16    | 7   | -   | 20               | -   | 24                | -   | ns   |
| $t_{su}$                 | set-up time                   | Dn to CP; see <a href="#">Figure 8</a>                       |       |     |     |                  |     |                   |     |      |
|                          |                               | $V_{CC} = 4.5$ V                                             | 12    | 3   | -   | 15               | -   | 18                | -   | ns   |
| $t_h$                    | hold time                     | Dn to CP; see <a href="#">Figure 8</a>                       |       |     |     |                  |     |                   |     |      |
|                          |                               | $V_{CC} = 4.5$ V                                             | 5     | –1  | -   | 5                | -   | 5                 | -   | ns   |
| $f_{max}$                | maximum frequency             | CP; see <a href="#">Figure 7</a>                             |       |     |     |                  |     |                   |     |      |
|                          |                               | $V_{CC} = 4.5$ V                                             | 30    | 69  | -   | 24               | -   | 20                | -   | MHz  |
|                          |                               | $V_{CC} = 5$ V; $C_L = 15$ pF                                | -     | 76  | -   | -                | -   | -                 | -   | MHz  |
| $C_{PD}$                 | power dissipation capacitance | $C_L = 50$ pF; $f = 1$ MHz;<br>$V_I = \text{GND to } V_{CC}$ | [5]   | -   | 25  | -                | -   | -                 | -   | pF   |

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

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

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

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

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

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

$C_L$  = output load capacitance in pF;

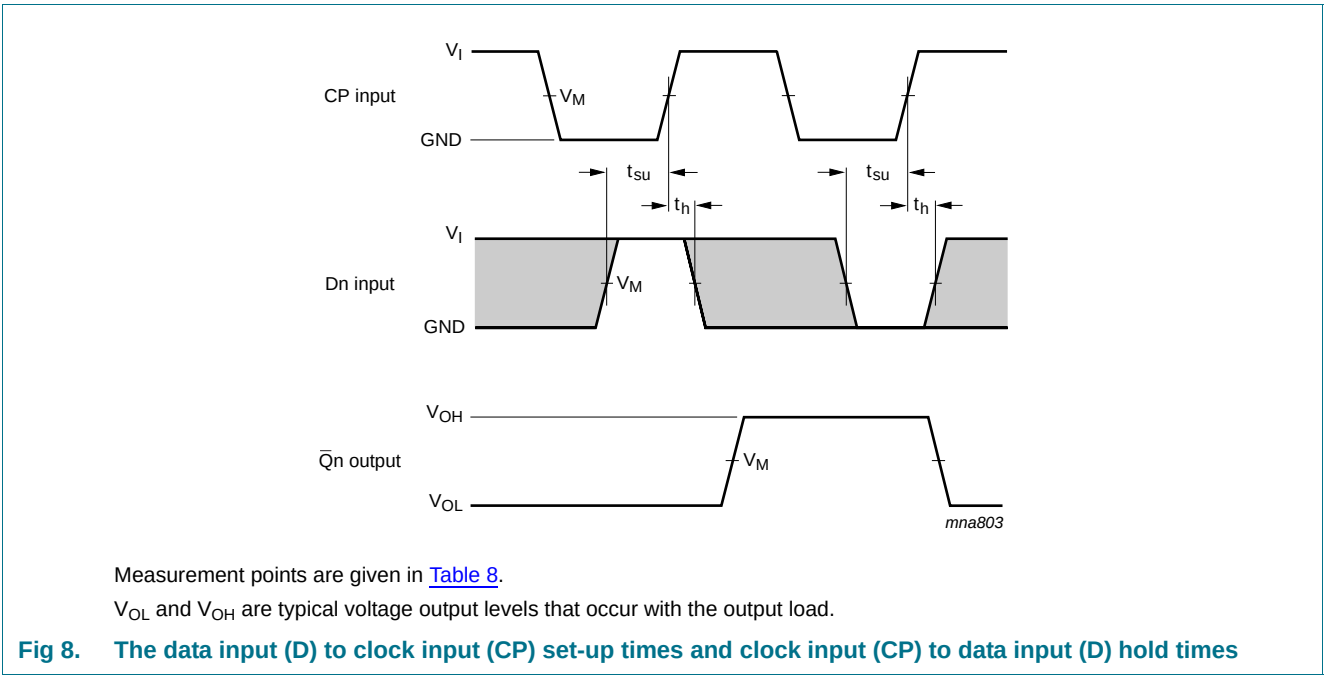
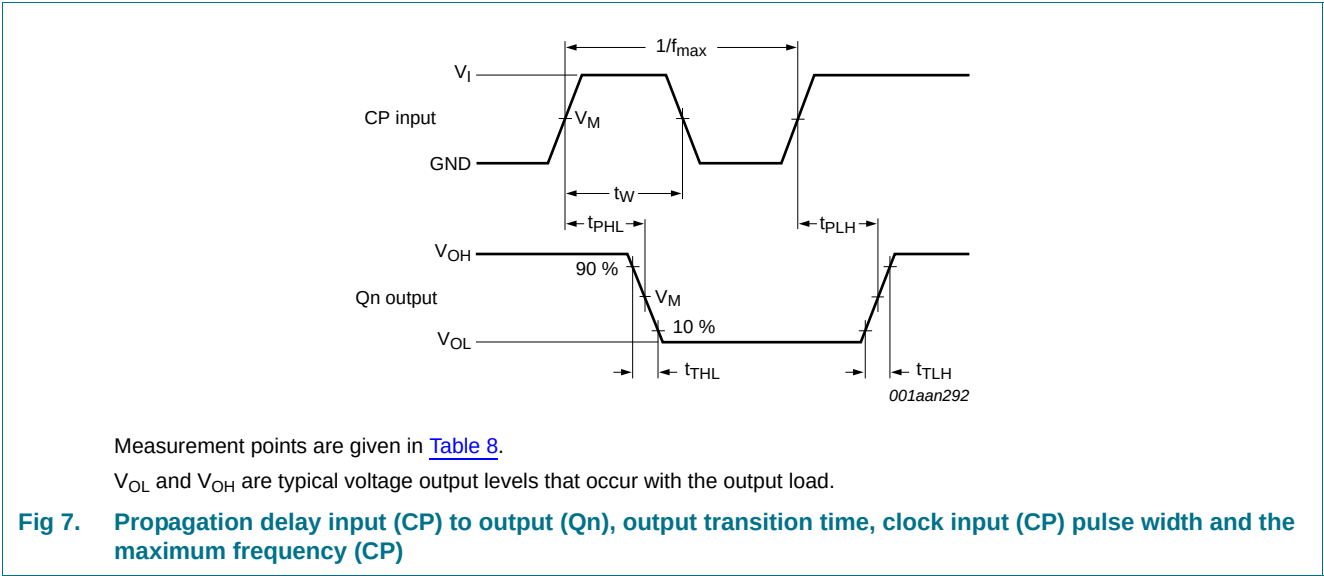
$V_{CC}$  = supply voltage in V;

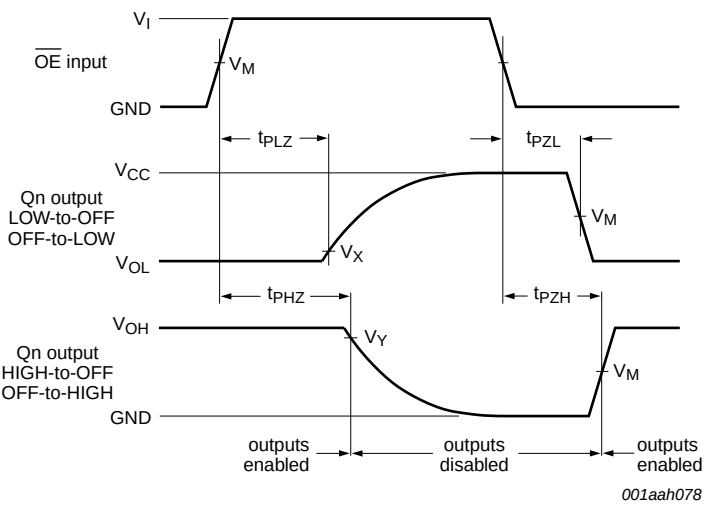
$N$  = number of inputs switching;

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



11. Waveforms





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

Fig 9. Enable and disable times

Table 8. Measurement points

| Type     | Input       | Output      |             |             |
|----------|-------------|-------------|-------------|-------------|
|          | $V_M$       | $V_M$       | $V_X$       | $V_Y$       |
| 74HC574  | $0.5V_{CC}$ | $0.5V_{CC}$ | $0.1V_{CC}$ | $0.9V_{CC}$ |
| 74HCT574 | 1.3 V       | 1.3 V       | $0.1V_{CC}$ | $0.9V_{CC}$ |

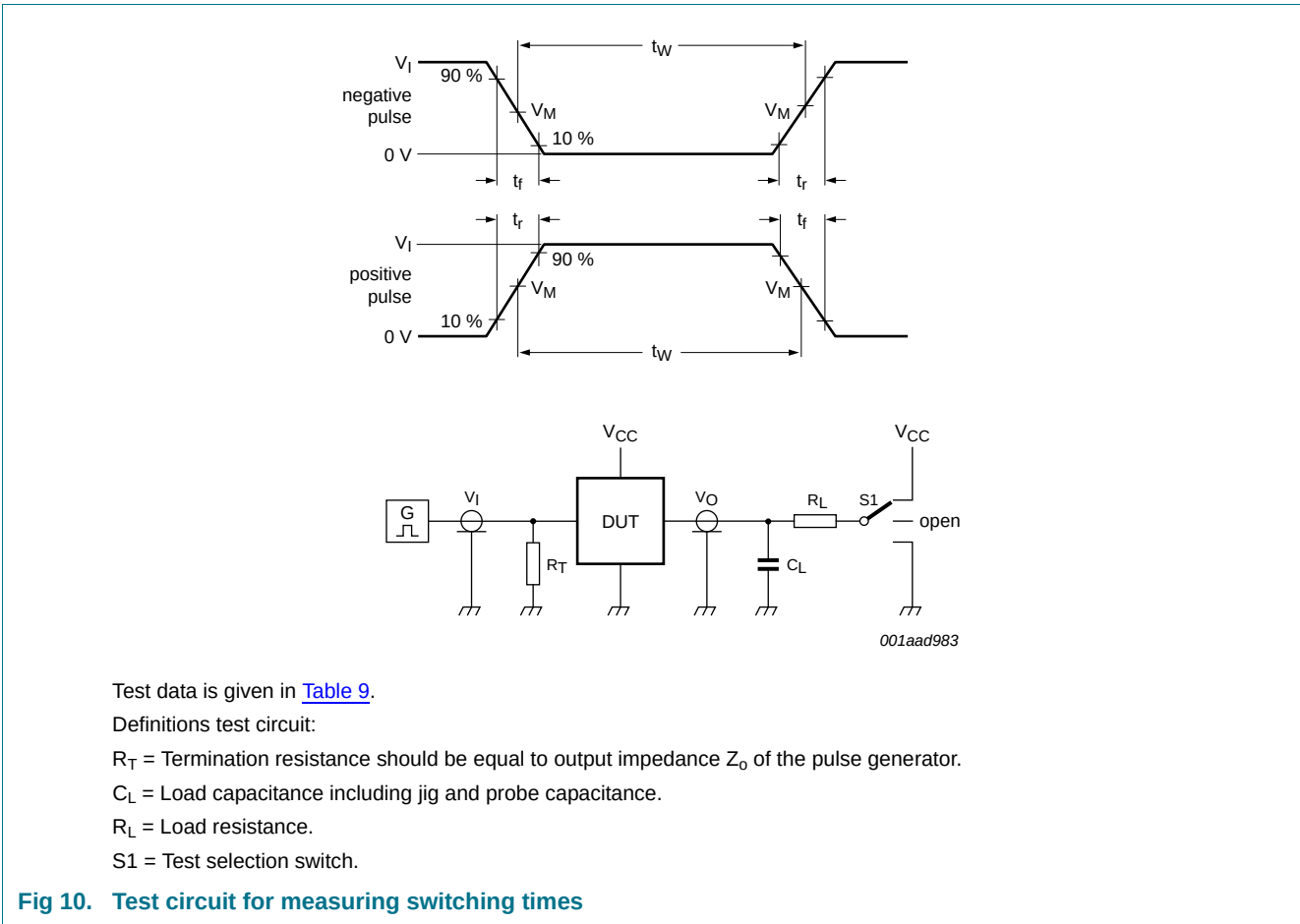


Table 9. Test data

| Type     | Input    |            | Load         |              | S1 position        |                    |                    |
|----------|----------|------------|--------------|--------------|--------------------|--------------------|--------------------|
|          | $V_I$    | $t_r, t_f$ | $C_L$        | $R_L$        | $t_{PHL}, t_{PLH}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ |
| 74HC574  | $V_{CC}$ | 6 ns       | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |
| 74HCT574 | 3 V      | 6 ns       | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |

12. Package outline

DIP20: plastic dual in-line package; 20 leads (300 mil)

SOT146-1

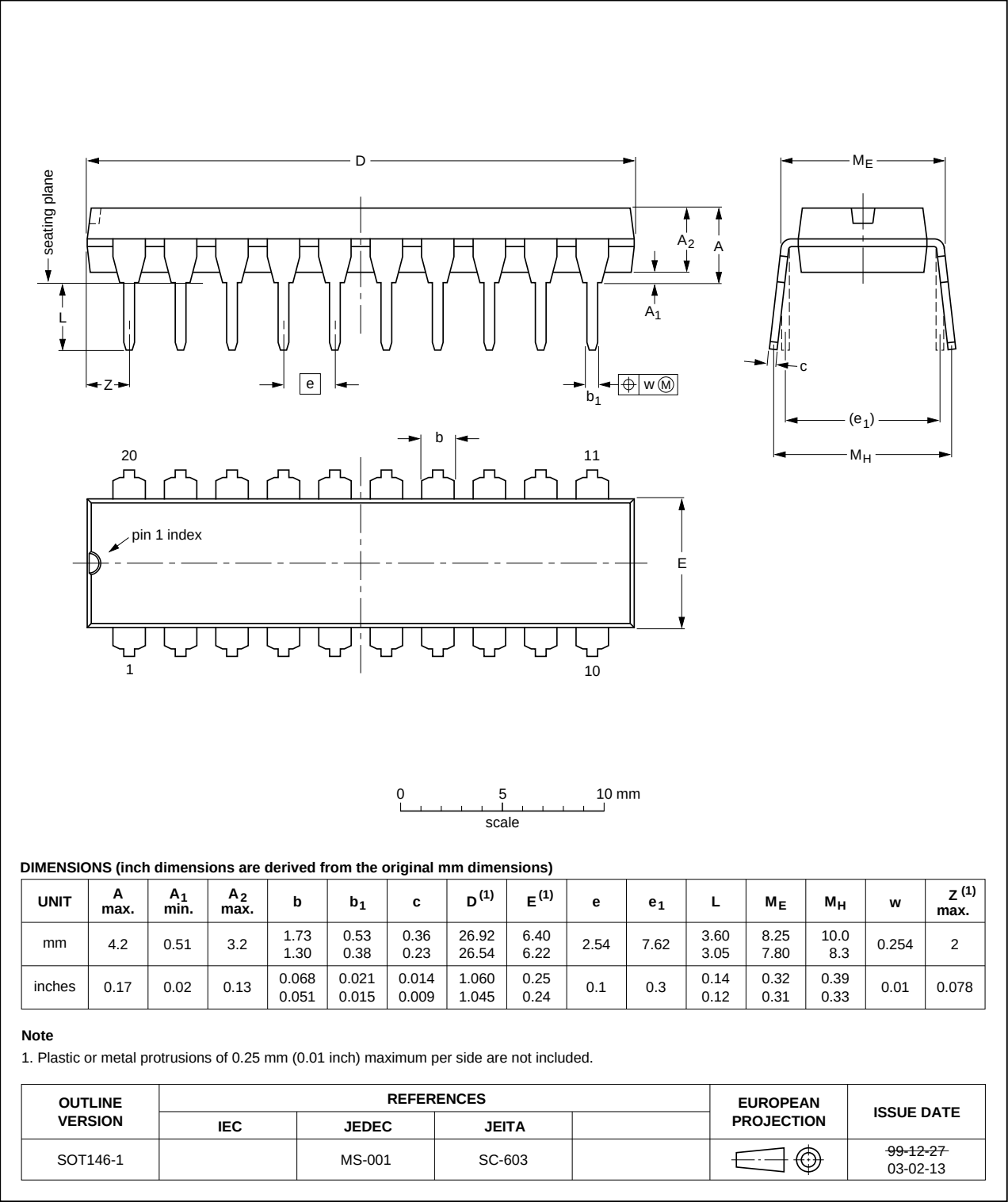
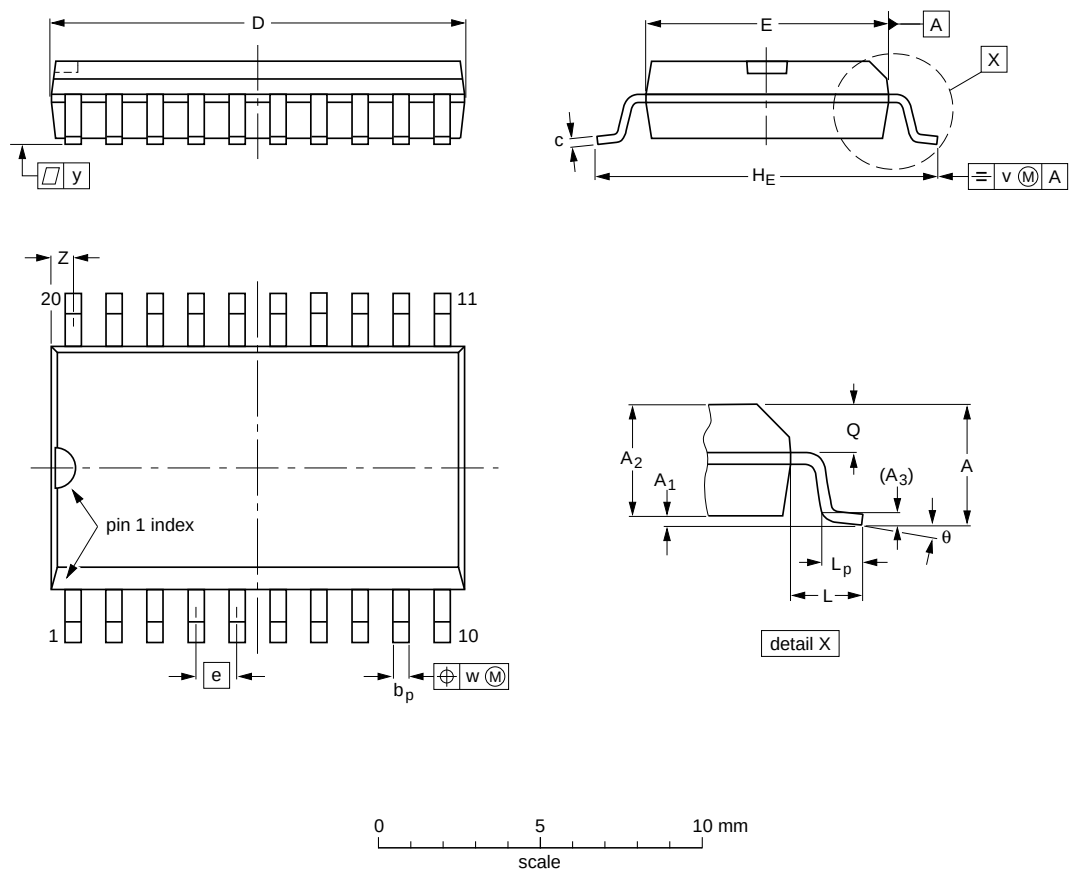


Fig 11. Package outline SOT146-1 (DIP20)

SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

| UNIT   | A<br>max. | A <sub>1</sub> | A <sub>2</sub> | A <sub>3</sub> | b <sub>p</sub> | c              | D <sup>(1)</sup> | E <sup>(1)</sup> | e    | H <sub>E</sub> | L     | L <sub>p</sub> | Q              | v    | w    | y     | z <sup>(1)</sup> | θ        |
|--------|-----------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|------|----------------|-------|----------------|----------------|------|------|-------|------------------|----------|
| mm     | 2.65      | 0.3<br>0.1     | 2.45<br>2.25   | 0.25           | 0.49<br>0.36   | 0.32<br>0.23   | 13.0<br>12.6     | 7.6<br>7.4       | 1.27 | 10.65<br>10.00 | 1.4   | 1.1<br>0.4     | 1.1<br>1.0     | 0.25 | 0.25 | 0.1   | 0.9<br>0.4       | 8°<br>0° |
| inches | 0.1       | 0.012<br>0.004 | 0.096<br>0.089 | 0.01           | 0.019<br>0.014 | 0.013<br>0.009 | 0.51<br>0.49     | 0.30<br>0.29     | 0.05 | 0.419<br>0.394 | 0.055 | 0.043<br>0.016 | 0.043<br>0.039 | 0.01 | 0.01 | 0.004 | 0.035<br>0.016   |          |

Note

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

| OUTLINE<br>VERSION | REFERENCES |        |       |  | EUROPEAN<br>PROJECTION | ISSUE DATE           |
|--------------------|------------|--------|-------|--|------------------------|----------------------|
|                    | IEC        | JEDEC  | JEITA |  |                        |                      |
| SOT163-1           | 075E04     | MS-013 |       |  |                        | 99-12-27<br>03-02-19 |

Fig 12. Package outline SOT163-1 (SO20)

SSOP20: plastic shrink small outline package; 20 leads; body width 5.3 mm

SOT339-1

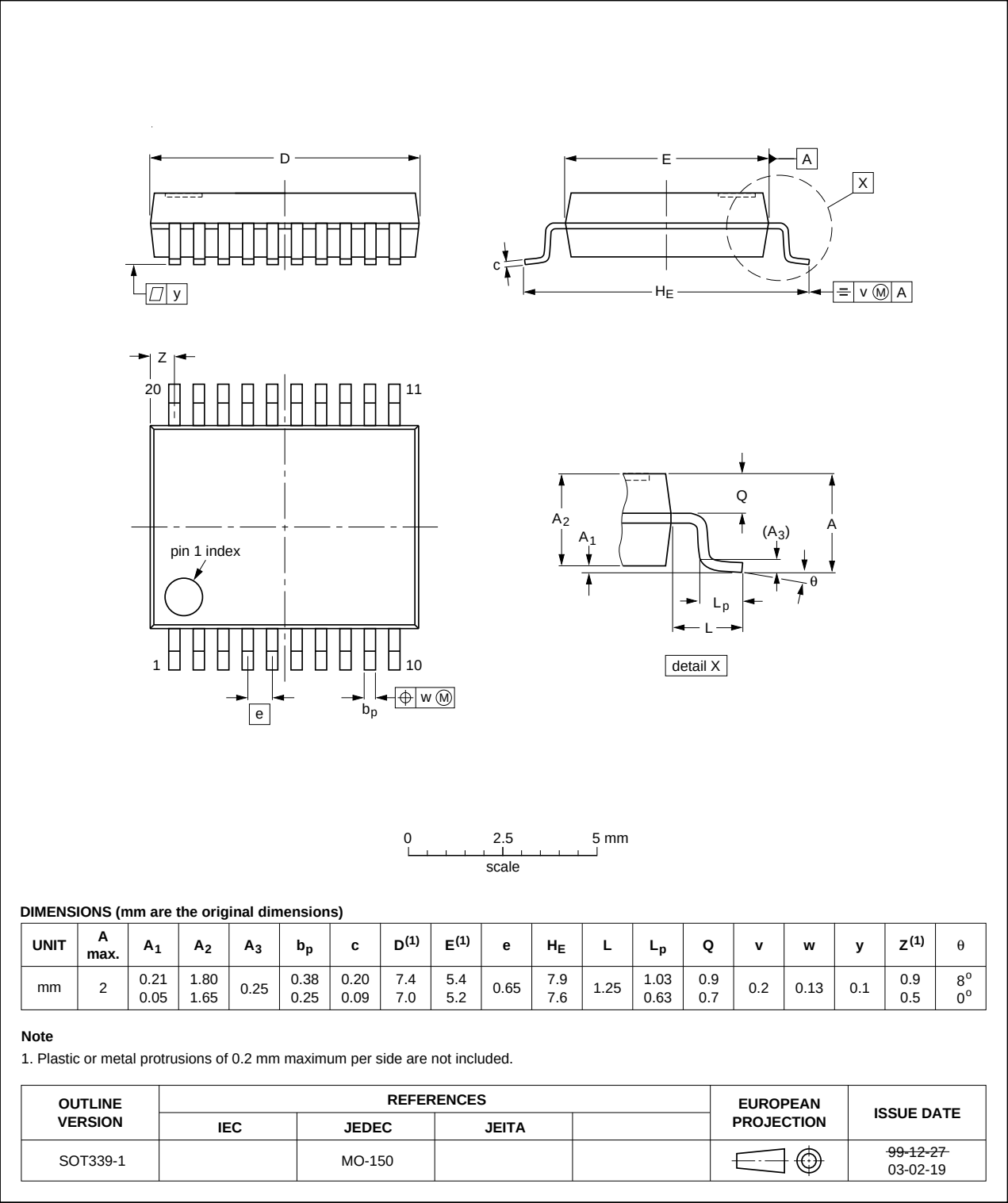


Fig 13. Package outline SOT339-1 (SSOP20)

TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm

SOT360-1

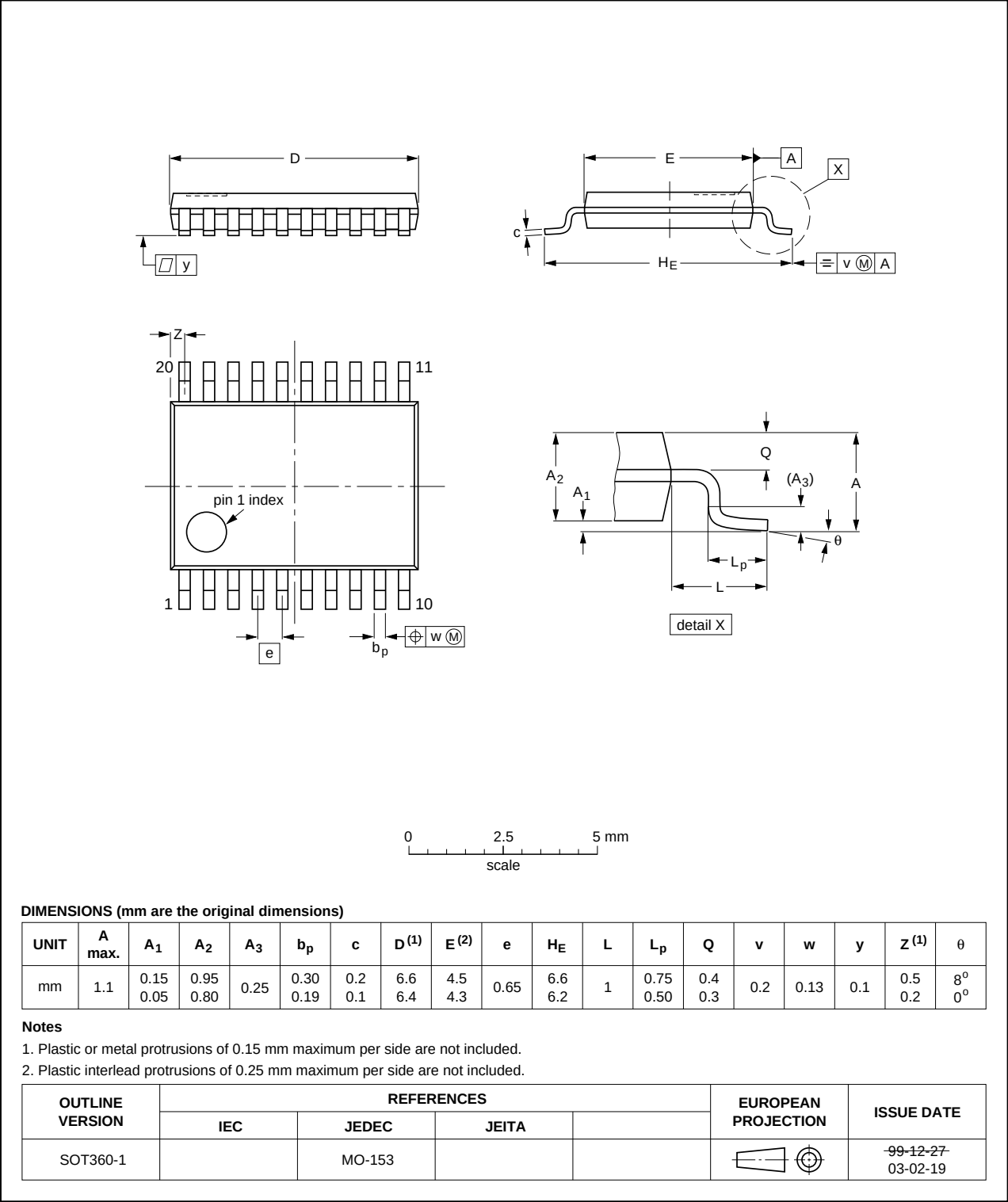


Fig 14. Package outline SOT360-1 (TSSOP20)

## 13. Abbreviations

Table 10. Abbreviations

| Acronym | Description                             |
|---------|-----------------------------------------|
| CMOS    | Complementary Metal Oxide Semiconductor |
| ESD     | ElectroStatic Discharge                 |
| HBM     | Human Body Model                        |
| MM      | Machine Model                           |
| TTL     | Transistor-Transistor Logic             |

## 14. Revision history

Table 11. Revision history

| Document ID         | Release date                                           | Data sheet status     | Change notice | Supersedes          |
|---------------------|--------------------------------------------------------|-----------------------|---------------|---------------------|
| 74HC_HCT574 v.5     | 20120425                                               | Product data sheet    | -             | 74HC_HCT574 v.4     |
| Modifications:      | • $V_X$ and $V_Y$ measurement points added to Table 8. |                       |               |                     |
| 74HC_HCT574 v.4     | 20111219                                               | Product data sheet    | -             | 74HC_HCT574 v.3     |
| Modifications:      | • Legal pages updated.                                 |                       |               |                     |
| 74HC_HCT574 v.3     | 20101215                                               | Product data sheet    | -             | 74HC_HCT574_CNV v.2 |
| 74HC_HCT574_CNV v.2 | 19970827                                               | Product specification | -             | -                   |



## 15. Legal information

### 15.1 Data sheet status

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

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

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

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

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Date of release: 25 April 2012

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