

# 74AHC574; 74AHCT574

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

Rev. 02 — 24 January 2008

Product data sheet

## 1. General description

The 74AHC574; 74AHCT574 are high-speed Si-gate CMOS devices and are pin compatible with Low Power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard no. 7A.

The 74AHC574; 74AHCT574 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 74AHC574; 74AHCT574 is functionally identical to the 74AHC564; 74AHCT564, but has non-inverting outputs. The 74AHC574; 74AHCT574 is functionally identical to the 74AHC374; 74AHCT374, but has a different pinning.

## 2. Features

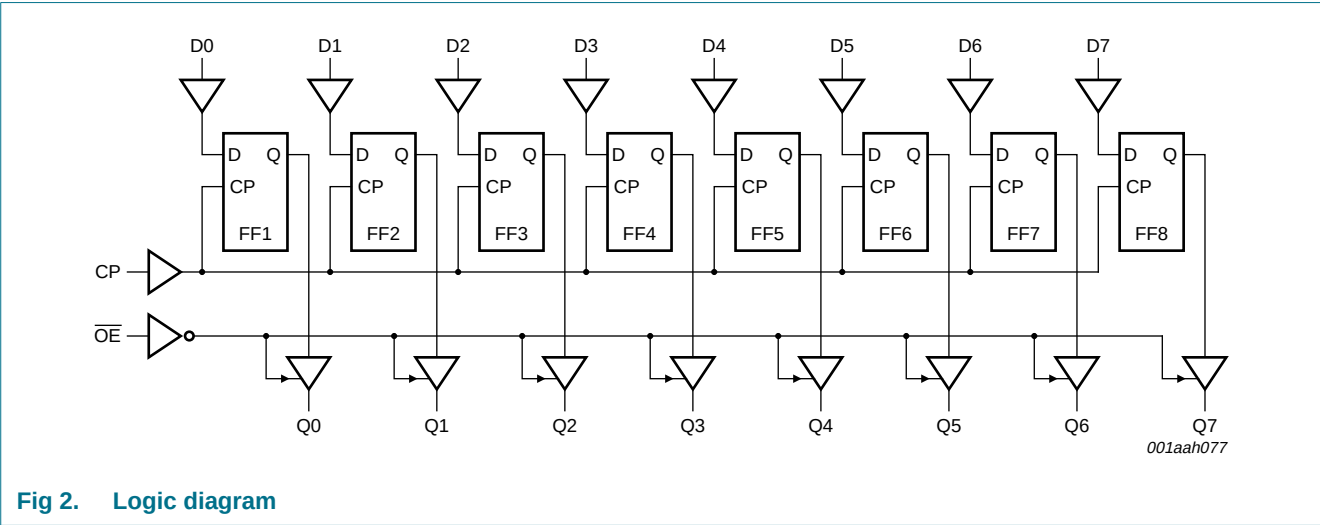
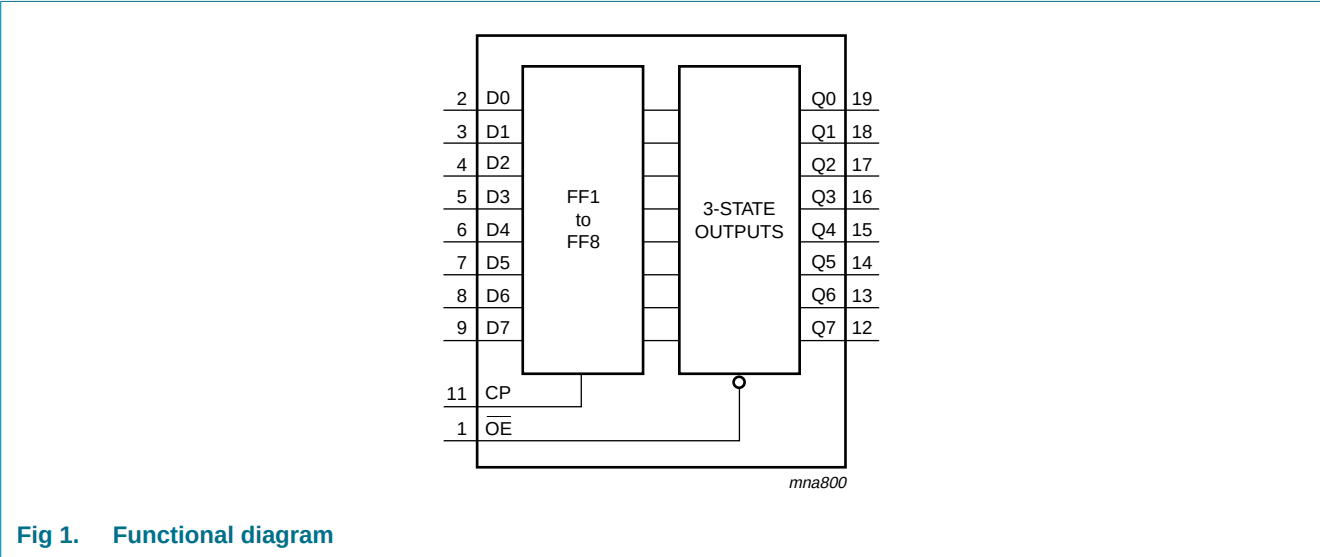
- Balanced propagation delays
- All inputs have a Schmitt-trigger action
- 3-state non-inverting outputs for bus orientated applications
- 8-bit positive, edge-triggered register
- Independent register and 3-state buffer operation
- Common 3-state output enable input
- For 74AHC574 only: operates with CMOS input levels
- For 74AHCT574 only: operates with TTL input levels
- ESD protection:
  - ◆ HBM JESD22-A114E exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
  - ◆ CDM 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  |
| 74AHC574D   | −40 °C to +125 °C | SO20     | plastic small outline package; 20 leads;<br>body width 7.5 mm                                                                        | SOT163-1 |
| 74AHCT574D  |                   |          |                                                                                                                                      |          |
| 74AHC574PW  | −40 °C to +125 °C | TSSOP20  | plastic thin shrink small outline package; 20 leads;<br>body width 4.4 mm                                                            | SOT360-1 |
| 74AHCT574PW |                   |          |                                                                                                                                      |          |
| 74AHC574BQ  | −40 °C to +125 °C | DHVQFN20 | plastic dual in-line compatible thermal enhanced<br>very thin quad flat package; no leads; 20 terminals;<br>body 2.5 × 4.5 × 0.85 mm | SOT764-1 |
| 74AHCT574BQ |                   |          |                                                                                                                                      |          |

4. Functional diagram



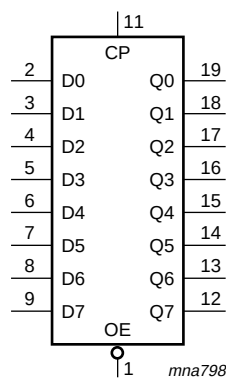


Fig 3. Logic symbol

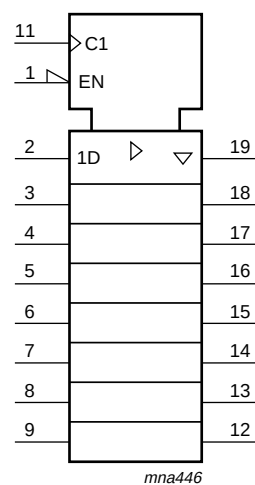
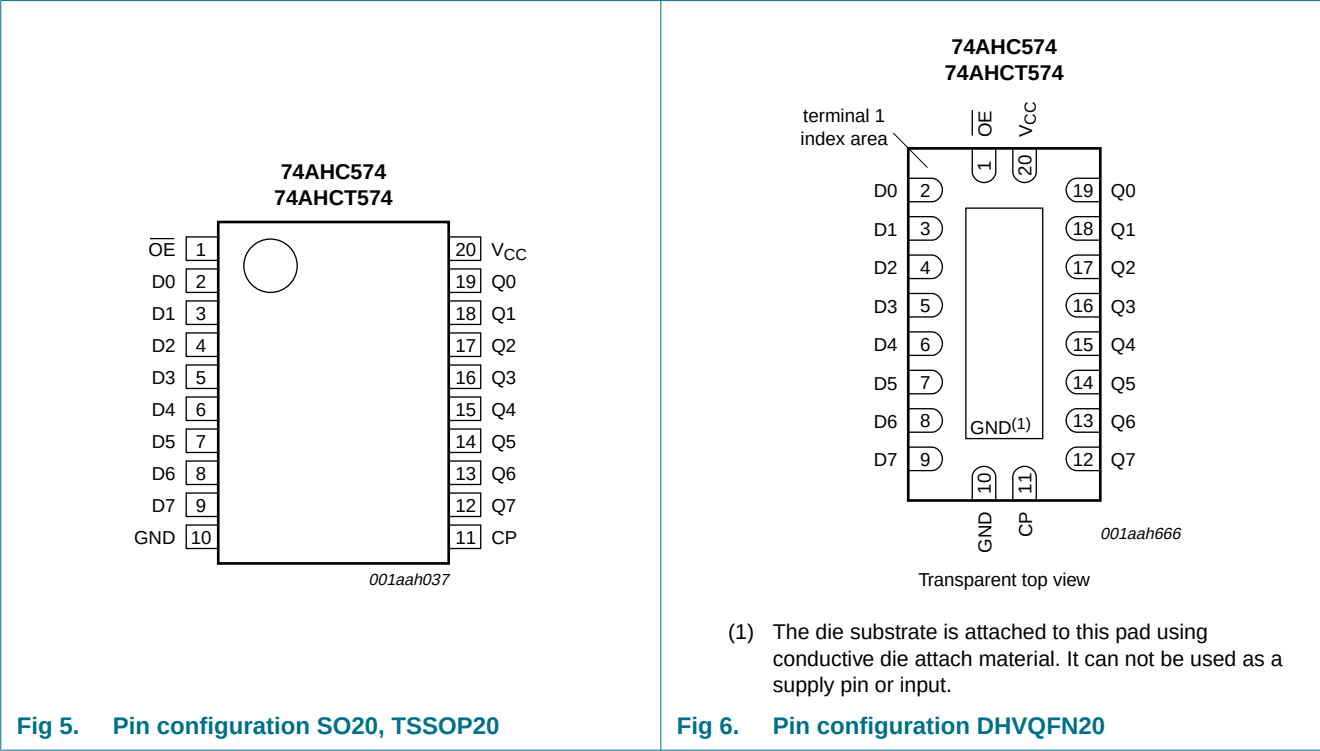


Fig 4. IEC logic symbol

5. Pinning information

5.1 Pinning



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 |
|----------------------------------|-----------------|----|----|--------------------|-----------|
|                                  | $\overline{OE}$ | 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 |
|-----------|-------------------------|------------------------------------------|--------------------|------|------|
| $V_{CC}$  | 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                           | <sup>[1]</sup> -20 | -    | mA   |
| $I_{OK}$  | output clamping current | $V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V | <sup>[1]</sup> -   | ±20  | mA   |
| $I_O$     | output current          | $V_O = -0.5$ V to $(V_{CC} + 0.5$ V)     | -                  | ±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            |                    |      |      |
|           | SO20 package            |                                          | <sup>[2]</sup> -   | 500  | mW   |
|           | TSSOP20 package         |                                          | <sup>[3]</sup> -   | 500  | mW   |
|           | DHVQFN20 package        |                                          | <sup>[4]</sup> -   | 500  | mW   |

- [1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.  
 [2]  $P_{tot}$  derates linearly with 8 mW/K above 70 °C.  
 [3]  $P_{tot}$  derates linearly with 5.5 mW/K above 60 °C.  
 [4]  $P_{tot}$  derates linearly with 4.5 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                      | 74AHC574 |     |                 | 74AHCT574 |     |                 | Unit |
|---------------------|-------------------------------------|---------------------------------|----------|-----|-----------------|-----------|-----|-----------------|------|
|                     |                                     |                                 | Min      | Typ | Max             | Min       | Typ | Max             |      |
| V <sub>CC</sub>     | supply voltage                      |                                 | 2.0      | 5.0 | 5.5             | 4.5       | 5.0 | 5.5             | V    |
| V <sub>I</sub>      | input voltage                       |                                 | 0        | -   | 5.5             | 0         | -   | 5.5             | 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> = 3.3 V ± 0.3 V | -        | -   | 100             | -         | -   | -               | ns/V |
|                     |                                     | V <sub>CC</sub> = 5.0 V ± 0.5 V | -        | -   | 20              | -         | -   | 20              | ns/V |

## 9. Static characteristics

**Table 6. Static characteristics**

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 |      |

### For type 74AHC574

|                 |                           |                                                                                                                        |      |     |       |      |      |      |       |    |
|-----------------|---------------------------|------------------------------------------------------------------------------------------------------------------------|------|-----|-------|------|------|------|-------|----|
| 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  |
| V <sub>OL</sub> | LOW-level output voltage  | I <sub>O</sub> = -8.0 mA; V <sub>CC</sub> = 4.5 V                                                                      | 3.94 | -   | -     | 3.8  | -    | 3.70 | -     | V  |
|                 |                           | 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>OZ</sub> | OFF-state output current  | 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>l</sub>  | input leakage current     | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V | -    | -   | ±0.25 | -    | ±2.5 | -    | ±10.0 | µA |
| 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                                 | -    | -   | 4.0   | -    | 40   | -    | 80    | µA |

**Table 6. Static characteristics ...continued**  
 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   |      |
| C <sub>I</sub>            | input capacitance         |                                                                                                                                                                                                   | -     | 3.0 | 10    | -                | 10   | -                 | 10    | pF   |
| C <sub>O</sub>            | output capacitance        |                                                                                                                                                                                                   | -     | 4.0 | -     | -                | -    | -                 | -     | pF   |
| <b>For type 74AHCT574</b> |                           |                                                                                                                                                                                                   |       |     |       |                  |      |                   |       |      |
| 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  | -   | -     | 3.8              | -    | 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>OZ</sub>           | OFF-state output current  | per input pin; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 5.5 V; I <sub>O</sub> = 0 A; V <sub>O</sub> = V <sub>CC</sub> or GND; other pins at V <sub>CC</sub> or GND | -     | -   | ±0.25 | -                | ±2.5 | -                 | ±10.0 | µA   |
| 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                                                                                                            | -     | -   | 4.0   | -                | 40   | -                 | 80    | µA   |
| ΔI <sub>CC</sub>          | additional supply current | per input pin; V <sub>I</sub> = V <sub>CC</sub> – 2.1 V; I <sub>O</sub> = 0 A; other pins at V <sub>CC</sub> or GND; V <sub>CC</sub> = 4.5 V to 5.5 V                                             | -     | -   | 1.35  | -                | 1.5  | -                 | 1.5   | mA   |
| C <sub>I</sub>            | input capacitance         |                                                                                                                                                                                                   | -     | 3   | 10    | -                | 10   | -                 | 10    | pF   |
| C <sub>O</sub>            | output capacitance        |                                                                                                                                                                                                   | -     | 4.0 | -     | -                | -    | -                 | -     | pF   |

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**  
*GND = 0 V. For test circuit see Figure 10.*

| 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  |      |
| For type 74AHC574 |                   |                                                          |       |                    |      |                  |      |                   |      |      |
| t <sub>pd</sub>   | propagation delay | CP to Qn; see <a href="#">Figure 7</a> <sup>[2]</sup>    |       |                    |      |                  |      |                   |      |      |
|                   |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                         |       |                    |      |                  |      |                   |      |      |
|                   |                   | C <sub>L</sub> = 15 pF                                   | -     | 6.5                | 13.2 | 1.0              | 15.5 | 1.0               | 16.5 | ns   |
|                   |                   | C <sub>L</sub> = 50 pF                                   | -     | 9.3                | 16.7 | 1.0              | 19.0 | 1.0               | 21.0 | ns   |
|                   |                   | V <sub>CC</sub> = 4.5 V to 5.5 V                         |       |                    |      |                  |      |                   |      |      |
|                   |                   | C <sub>L</sub> = 15 pF                                   | -     | 4.4                | 8.6  | 1.0              | 10.0 | 1.0               | 11.0 | ns   |
|                   |                   | C <sub>L</sub> = 50 pF                                   |       | 6.2                | 10.6 | 1.0              | 12.0 | 1.0               | 13.5 | ns   |
| t <sub>en</sub>   | enable time       | OE to Qn; see <a href="#">Figure 9</a> <sup>[1]</sup>    |       |                    |      |                  |      |                   |      |      |
|                   |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                         |       |                    |      |                  |      |                   |      |      |
|                   |                   | C <sub>L</sub> = 15 pF                                   | -     | 5.7                | 12.8 | 1.0              | 15.0 | 1.0               | 16.0 | ns   |
|                   |                   | C <sub>L</sub> = 50 pF                                   | -     | 8.2                | 16.3 | 1.0              | 18.5 | 1.0               | 20.5 | ns   |
|                   |                   | V <sub>CC</sub> = 4.5 V to 5.5 V                         |       |                    |      |                  |      |                   |      |      |
|                   |                   | C <sub>L</sub> = 15 pF                                   | -     | 4.2                | 9.0  | 1.0              | 10.5 | 1.0               | 11.5 | ns   |
|                   |                   | C <sub>L</sub> = 50 pF                                   | -     | 5.9                | 11.0 | 1.0              | 12.5 | 1.0               | 14.0 | ns   |
| t <sub>dis</sub>  | disable time      | OE to Qn; see <a href="#">Figure 9</a> <sup>[2]</sup>    |       |                    |      |                  |      |                   |      |      |
|                   |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                         |       |                    |      |                  |      |                   |      |      |
|                   |                   | C <sub>L</sub> = 15 pF                                   | -     | 6.3                | 13.0 | 1.0              | 15.0 | 1.0               | 16.5 | ns   |
|                   |                   | C <sub>L</sub> = 50 pF                                   | -     | 9.1                | 15.0 | 1.0              | 17.0 | 1.0               | 19.0 | ns   |
|                   |                   | V <sub>CC</sub> = 4.5 V to 5.5 V                         |       |                    |      |                  |      |                   |      |      |
|                   |                   | C <sub>L</sub> = 15 pF                                   | -     | 4.3                | 9.0  | 1.0              | 10.5 | 1.0               | 11.5 | ns   |
|                   |                   | C <sub>L</sub> = 50 pF                                   | -     | 6.9                | 10.1 | 1.0              | 11.5 | 1.0               | 13.0 | ns   |
| f <sub>max</sub>  | maximum frequency | CP; see <a href="#">Figure 7</a>                         |       |                    |      |                  |      |                   |      |      |
|                   |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                         |       |                    |      |                  |      |                   |      |      |
|                   |                   | C <sub>L</sub> = 15 pF                                   | 80    | 125                | -    | 65               | -    | 65                | -    | MHz  |
|                   |                   | C <sub>L</sub> = 50 pF                                   | 50    | 75                 | -    | 45               | -    | 45                | -    | MHz  |
|                   |                   | V <sub>CC</sub> = 4.5 V to 5.5 V                         |       |                    |      |                  |      |                   |      |      |
|                   |                   | C <sub>L</sub> = 15 pF                                   | 130   | 180                | -    | 110              | -    | 110               | -    | MHz  |
|                   |                   | C <sub>L</sub> = 50 pF                                   | 85    | 115                | -    | 75               | -    | 75                | -    | MHz  |
| t <sub>w</sub>    | pulse width       | CP; HIGH or LOW; see <a href="#">Figure 7</a>            |       |                    |      |                  |      |                   |      |      |
|                   |                   | V <sub>CC</sub> = 3.0 V to 3.6 V; C <sub>L</sub> = 50 pF | 5.0   | -                  | -    | 5.0              | -    | 5.0               | -    | ns   |
|                   |                   | V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 50 pF | 5.0   | -                  | -    | 5.0              | -    | 5.0               | -    | ns   |



**Table 7. Dynamic characteristics ...continued**  
*GND = 0 V. For test circuit see Figure 10.*

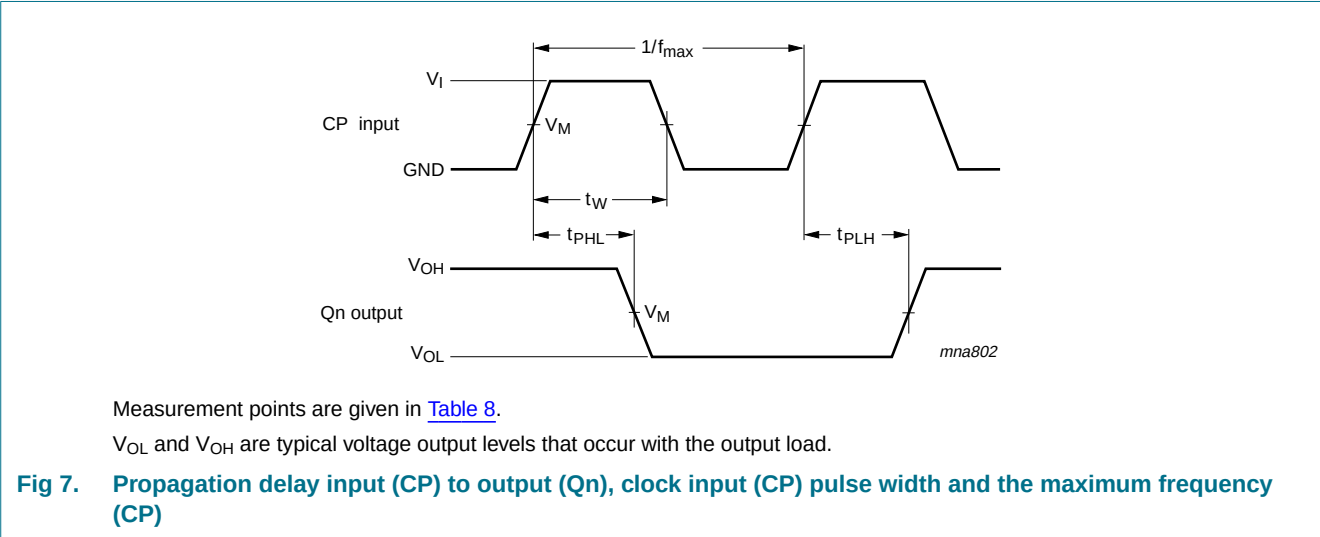
| Symbol                    | Parameter                     | Conditions                                                                                 | 25 °C |                    |     | –40 °C to +85 °C |      | –40 °C to +125 °C |      | Unit |
|---------------------------|-------------------------------|--------------------------------------------------------------------------------------------|-------|--------------------|-----|------------------|------|-------------------|------|------|
|                           |                               |                                                                                            | Min   | Typ <sup>[1]</sup> | Max | Min              | Max  | Min               | Max  |      |
| t <sub>su</sub>           | set-up time                   | Dn to CP; see Figure 8                                                                     |       |                    |     |                  |      |                   |      |      |
|                           |                               | V <sub>CC</sub> = 3.0 V to 3.6 V;<br>C <sub>L</sub> = 50 pF                                | 3.5   | -                  | -   | 3.5              | -    | 3.5               | -    | ns   |
|                           |                               | V <sub>CC</sub> = 4.5 V to 5.5 V;<br>C <sub>L</sub> = 50 pF                                | 3.0   | -                  | -   | 3.0              | -    | 3.0               | -    | ns   |
| t <sub>h</sub>            | hold time                     | Dn to CP; see Figure 8                                                                     |       |                    |     |                  |      |                   |      |      |
|                           |                               | V <sub>CC</sub> = 3.0 V to 3.6 V;<br>C <sub>L</sub> = 50 pF                                | 1.5   | -                  | -   | 1.5              | -    | 1.5               | -    | ns   |
|                           |                               | V <sub>CC</sub> = 4.5 V to 5.5 V;<br>C <sub>L</sub> = 50 pF                                | 1.5   | -                  | -   | 1.5              | -    | 1.5               | -    | ns   |
| C <sub>PD</sub>           | power dissipation capacitance | C <sub>L</sub> = 50 pF; f <sub>i</sub> = 1 MHz;<br>V <sub>I</sub> = GND to V <sub>CC</sub> | [3]   | -                  | 10  | -                | -    | -                 | -    | pF   |
| <b>For type 74AHCT574</b> |                               |                                                                                            |       |                    |     |                  |      |                   |      |      |
| t <sub>pd</sub>           | propagation delay             | CP to Qn; see Figure 7 [2]                                                                 |       |                    |     |                  |      |                   |      |      |
|                           |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                                           |       |                    |     |                  |      |                   |      |      |
|                           |                               | C <sub>L</sub> = 15 pF                                                                     | -     | 4.4                | 8.6 | 1.0              | 10.0 | 1.0               | 11.0 | ns   |
| t <sub>en</sub>           | enable time                   | OE to Qn; see Figure 9                                                                     |       |                    |     |                  |      |                   |      |      |
|                           |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                                           |       |                    |     |                  |      |                   |      |      |
|                           |                               | C <sub>L</sub> = 15 pF                                                                     | -     | 4.3                | 9.0 | 1.0              | 10.5 | 1.0               | 11.5 | ns   |
| t <sub>dis</sub>          | disable time                  | OE to Qn; see Figure 9 [2]                                                                 |       |                    |     |                  |      |                   |      |      |
|                           |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                                           |       |                    |     |                  |      |                   |      |      |
|                           |                               | C <sub>L</sub> = 15 pF                                                                     | -     | 4.3                | 9.0 | 1.0              | 10.5 | 1.0               | 11.5 | ns   |
| f <sub>max</sub>          | maximum frequency             | CP; see Figure 7                                                                           |       |                    |     |                  |      |                   |      |      |
|                           |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                                           |       |                    |     |                  |      |                   |      |      |
|                           |                               | C <sub>L</sub> = 15 pF                                                                     | 130   | 180                | -   | 110              | -    | 110               | -    | MHz  |
| t <sub>w</sub>            | pulse width                   | CP; HIGH or LOW;<br>see Figure 7                                                           |       |                    |     |                  |      |                   |      |      |
|                           |                               | V <sub>CC</sub> = 4.5 V to 5.5 V;<br>C <sub>L</sub> = 50 pF                                | 5.0   | -                  | -   | 5.5              | -    | 5.5               | -    | ns   |
| t <sub>su</sub>           | set-up time                   | Dn to CP; see Figure 8                                                                     |       |                    |     |                  |      |                   |      |      |
|                           |                               | V <sub>CC</sub> = 4.5 V to 5.5 V;<br>C <sub>L</sub> = 50 pF                                | 3.0   | -                  | -   | 3.5              | -    | 3.5               | -    | ns   |

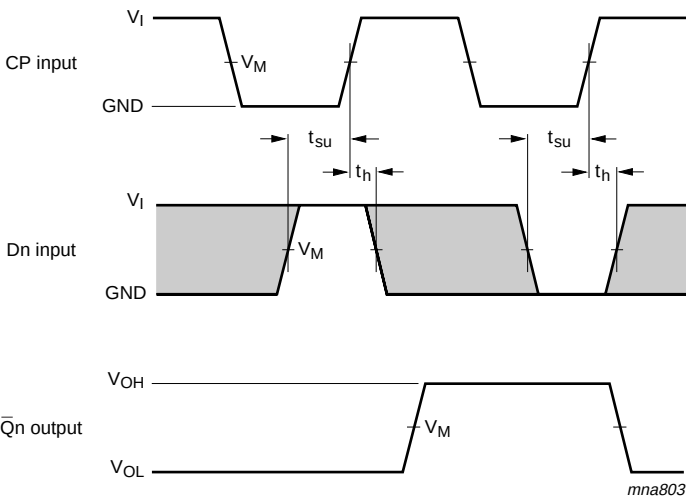
Table 7. Dynamic characteristics ...continued  
GND = 0 V. For test circuit see Figure 10.

| 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 |      |
| t <sub>h</sub>  | hold time                     | Dn to CP; see Figure 8<br>V <sub>CC</sub> = 4.5 V to 5.5 V;<br>C <sub>L</sub> = 50 pF        | 1.5   | -                  | -   | 1.5              | -   | 1.5               | -   | ns   |
| C <sub>PD</sub> | power dissipation capacitance | per buffer;<br>C <sub>L</sub> = 50 pF; f = 1 MHz;<br>V <sub>I</sub> = GND to V <sub>CC</sub> | [3]   | -                  | 12  | -                | -   | -                 | -   | pF   |

- [1] Typical values are measured at nominal supply voltage (V<sub>CC</sub> = 3.3 V and V<sub>CC</sub> = 5.0 V).
- [2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.  
t<sub>en</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>.  
t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>.
- [3] C<sub>PD</sub> is used to determine the dynamic power dissipation P<sub>D</sub> (μW).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o)$  where:  
f<sub>i</sub> = input frequency in MHz;  
f<sub>o</sub> = output frequency in MHz;  
C<sub>L</sub> = output load capacitance in pF;  
V<sub>CC</sub> = supply voltage in V.

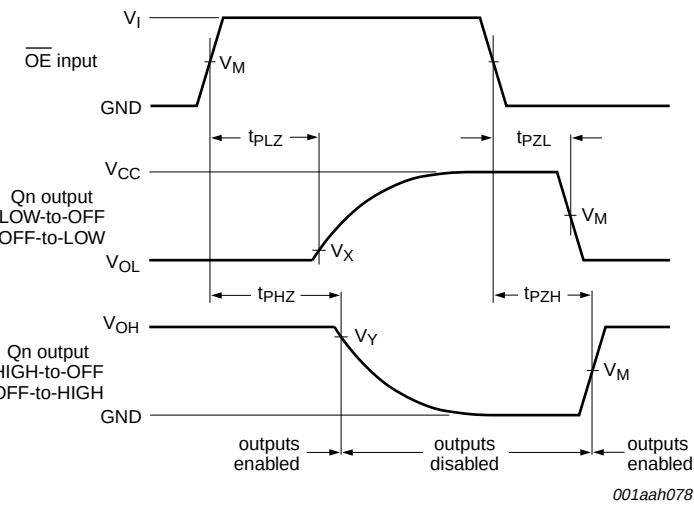
10.1 Waveforms





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

**Fig 8. The data input (D) to clock input (CP) set-up times and clock input (CP) to data input (D) hold times**

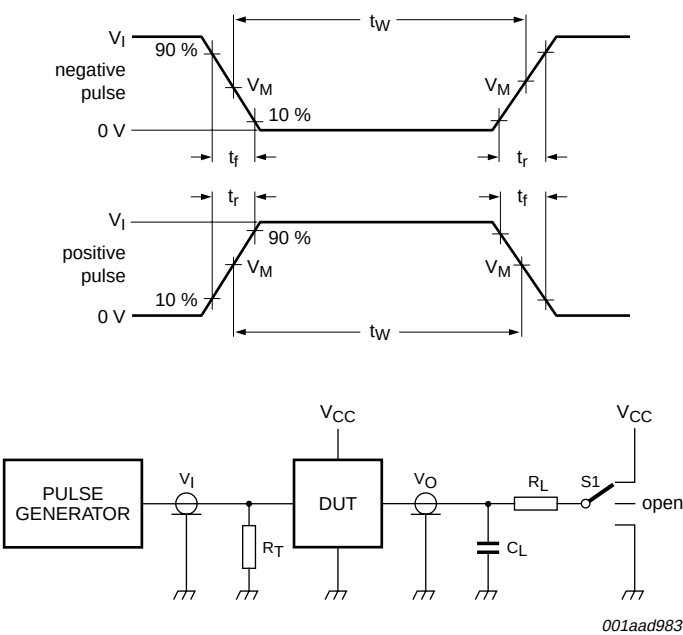


Measurement points are given in [Table 8](#).  
 $V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

**Fig 9. Enable and disable times**

**Table 8. Measurement points**

| Type      | Input       | Output      |                         |                         |
|-----------|-------------|-------------|-------------------------|-------------------------|
|           | $V_M$       | $V_M$       | $V_X$                   | $V_Y$                   |
| 74AHC574  | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL} + 0.3\text{ V}$ | $V_{OH} - 0.3\text{ V}$ |
| 74AHCT574 | 1.5 V       | $0.5V_{CC}$ | $V_{OL} + 0.3\text{ V}$ | $V_{OH} - 0.3\text{ V}$ |



Test data is given in [Table 9](#).  
Definitions test circuit:  
 $R_T$  = Termination resistance should be equal to output impedance  $Z_o$  of the pulse generator.  
 $C_L$  = Load capacitance including jig and probe capacitance.  
 $R_L$  = Load resistance.  
 $S1$  = Test selection switch.

Fig 10. Load circuitry for switching times

Table 9. Test data

| Type      | Input    |            | Load         |              | S1 position        |                    |                    |
|-----------|----------|------------|--------------|--------------|--------------------|--------------------|--------------------|
|           | $V_I$    | $t_r, t_f$ | $C_L$        | $R_L$        | $t_{PHL}, t_{PLH}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ |
| 74AHC574  | $V_{CC}$ | 3.0 ns     | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |
| 74AHCT574 | 3.0 V    | 3.0 ns     | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |

11. Package outline

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

SOT163-1

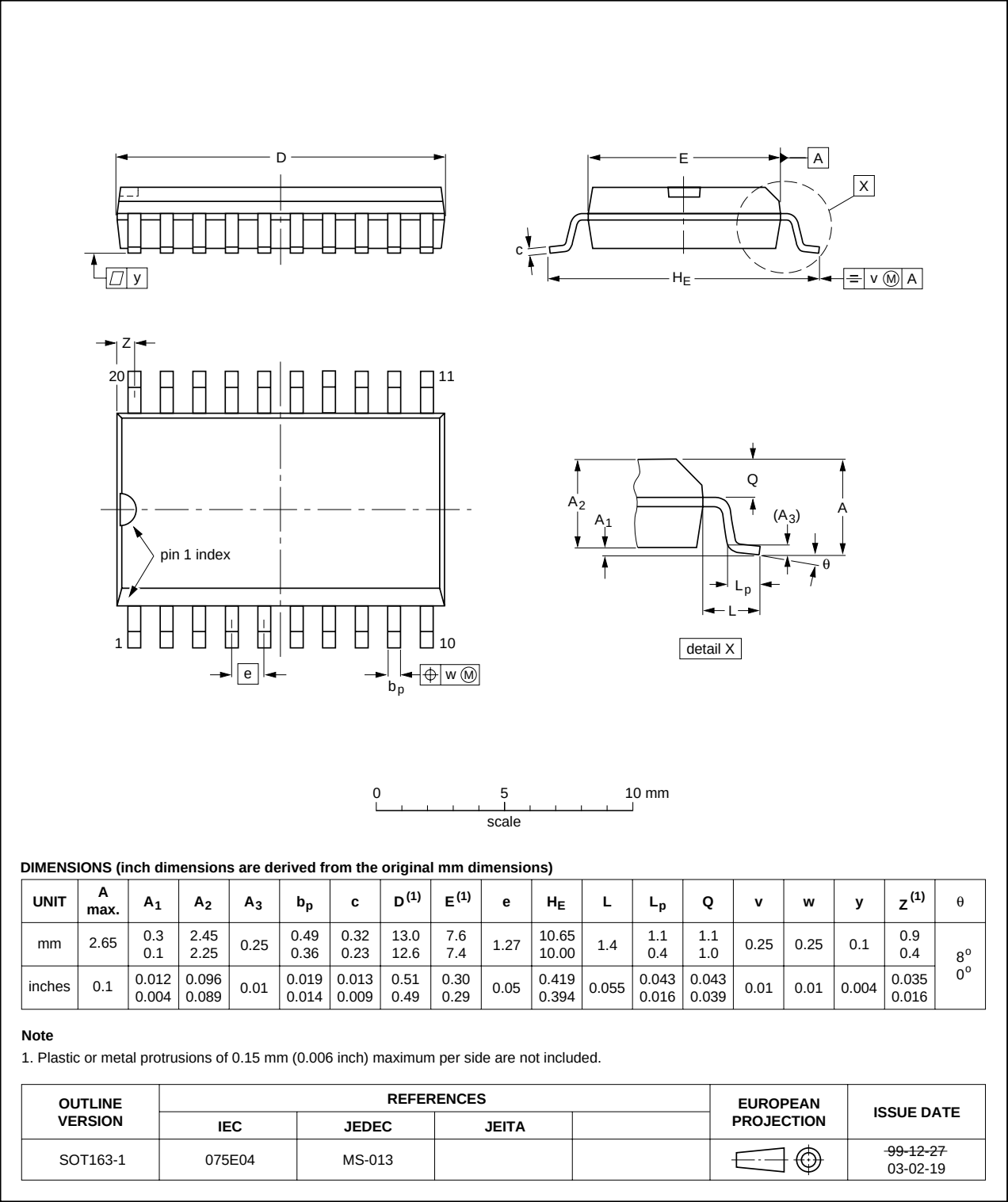
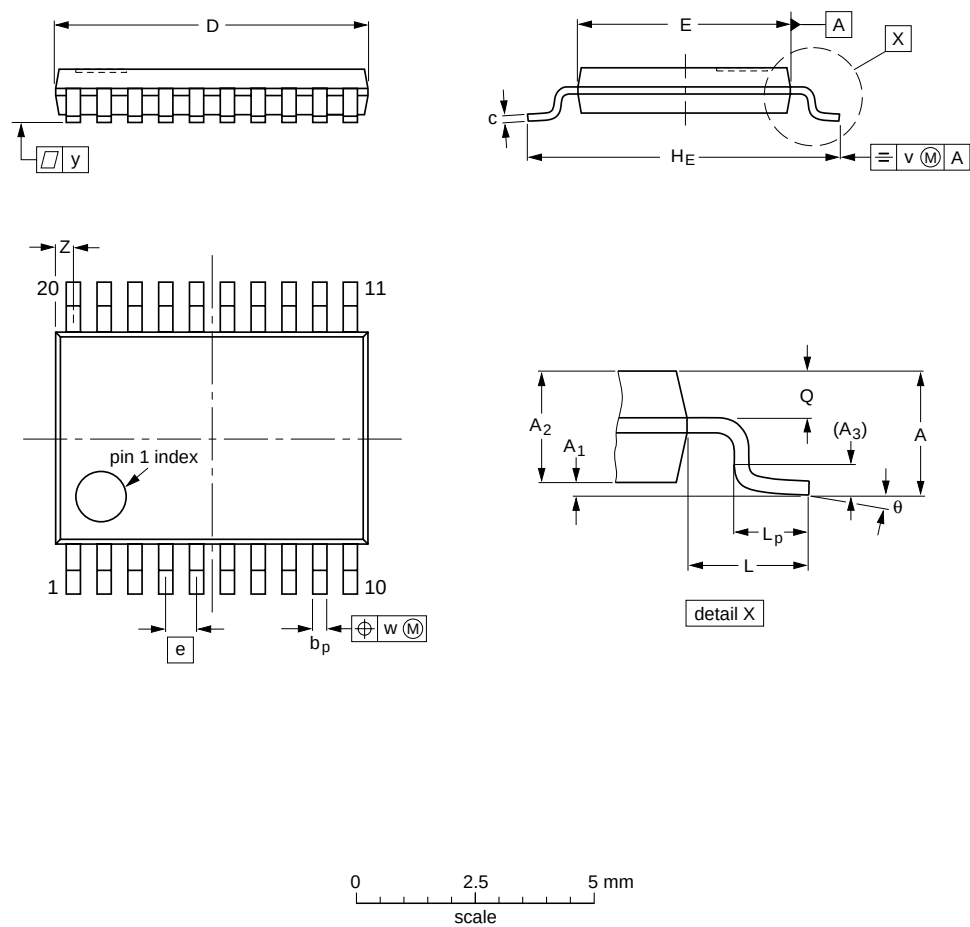


Fig 11. Package outline SOT163-1 (SO20)

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

SOT360-1



DIMENSIONS (mm are the original dimensions)

| UNIT | A max. | A <sub>1</sub> | A <sub>2</sub> | A <sub>3</sub> | b <sub>p</sub> | c          | D <sup>(1)</sup> | E <sup>(2)</sup> | e    | H <sub>E</sub> | L | L <sub>p</sub> | Q          | v   | w    | y   | z <sup>(1)</sup> | θ        |
|------|--------|----------------|----------------|----------------|----------------|------------|------------------|------------------|------|----------------|---|----------------|------------|-----|------|-----|------------------|----------|
| mm   | 1.1    | 0.15<br>0.05   | 0.95<br>0.80   | 0.25           | 0.30<br>0.19   | 0.2<br>0.1 | 6.6<br>6.4       | 4.5<br>4.3       | 0.65 | 6.6<br>6.2     | 1 | 0.75<br>0.50   | 0.4<br>0.3 | 0.2 | 0.13 | 0.1 | 0.5<br>0.2       | 8°<br>0° |

- Notes
- 1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
  - 2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES |        |       |  | EUROPEAN PROJECTION | ISSUE DATE           |
|-----------------|------------|--------|-------|--|---------------------|----------------------|
|                 | IEC        | JEDEC  | JEITA |  |                     |                      |
| SOT360-1        |            | MO-153 |       |  |                     | 99-12-27<br>03-02-19 |

Fig 12. Package outline SOT360-1 (TSSOP20)

DHVQFN20: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 x 4.5 x 0.85 mm SOT764-1

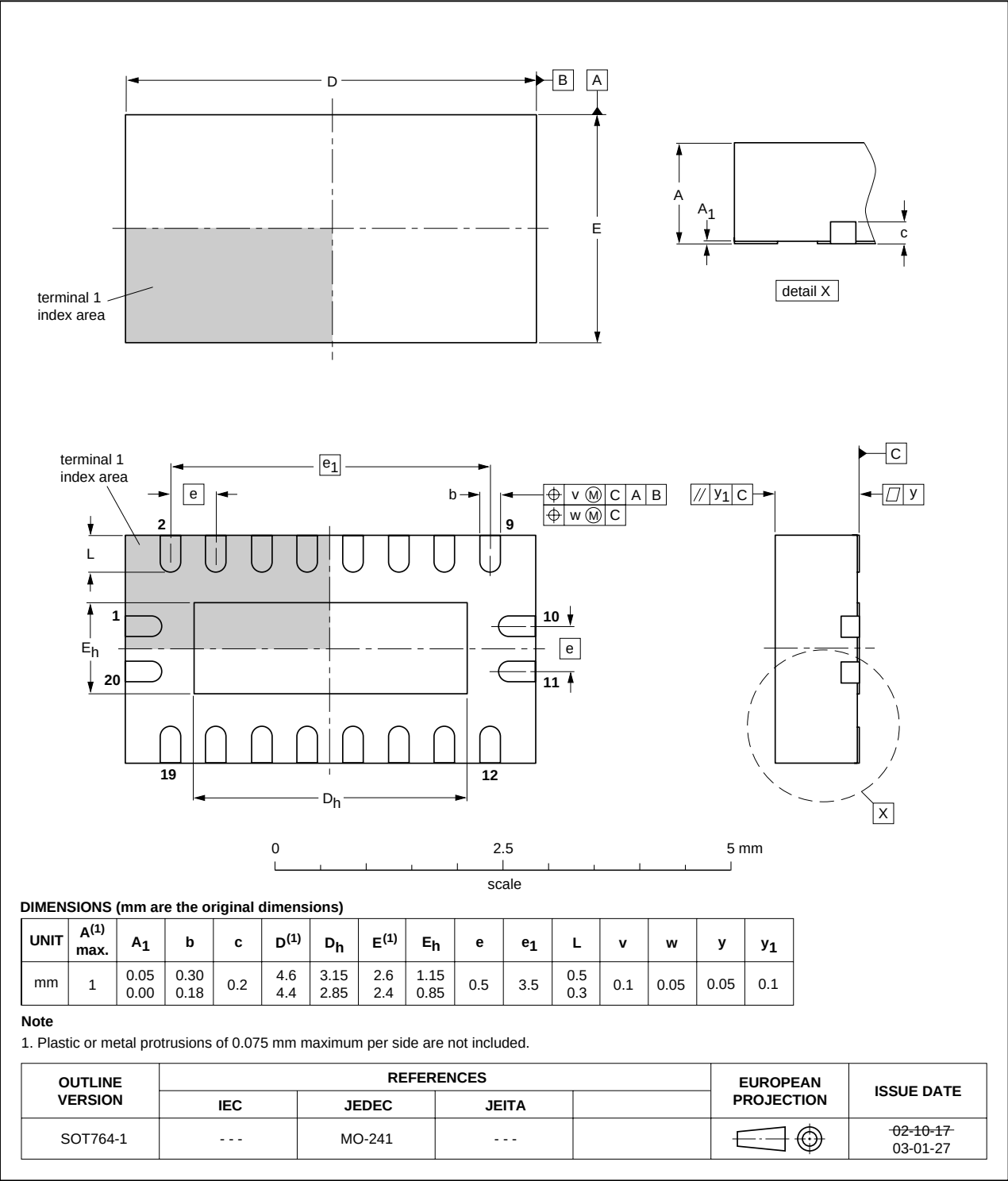


Fig 13. Package outline SOT764-1 (DHVQFN20)

## 12. Abbreviations

Table 10. Abbreviations

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

## 13. Revision history

Table 11. Revision history

| Document ID     | Release date                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Data sheet status     | Change notice | Supersedes      |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|-----------------|
| 74AHC_AHCT574_2 | 20080124                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Product data sheet    | -             | 74AHC_AHCT574_1 |
| Modifications:  | <ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li><li>• <a href="#">Section 3</a>: DHVQFN20 package added.</li><li>• <a href="#">Section 7</a>: derating values added for DHVQFN20 package.</li><li>• <a href="#">Section 11</a>: outline drawing added for DHVQFN20 package.</li></ul> |                       |               |                 |
| 74AHC_AHCT574_1 | 19990616                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Product specification | -             | -               |



## 14. Legal information

### 14.1 Data sheet status

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

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

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

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

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## 16. Contents

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