

# 74ALVC574

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

Rev. 02 — 8 November 2007

Product data sheet

## 1. General description

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The 74ALVC574 is an octal D-type flip-flop featuring separate D-type inputs for each flip-flop and 3-state outputs for bus-oriented applications. A clock input (CP) and an outputs enable input ( $\overline{OE}$ ) are common to all flip-flops.

The eight 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 pin  $\overline{OE}$  is LOW, the contents of the eight flip-flops is available at the outputs. When pin  $\overline{OE}$  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 74ALVC574 is functionally identical to the 74ALVC374, but has a different pin arrangement.

## 2. Features

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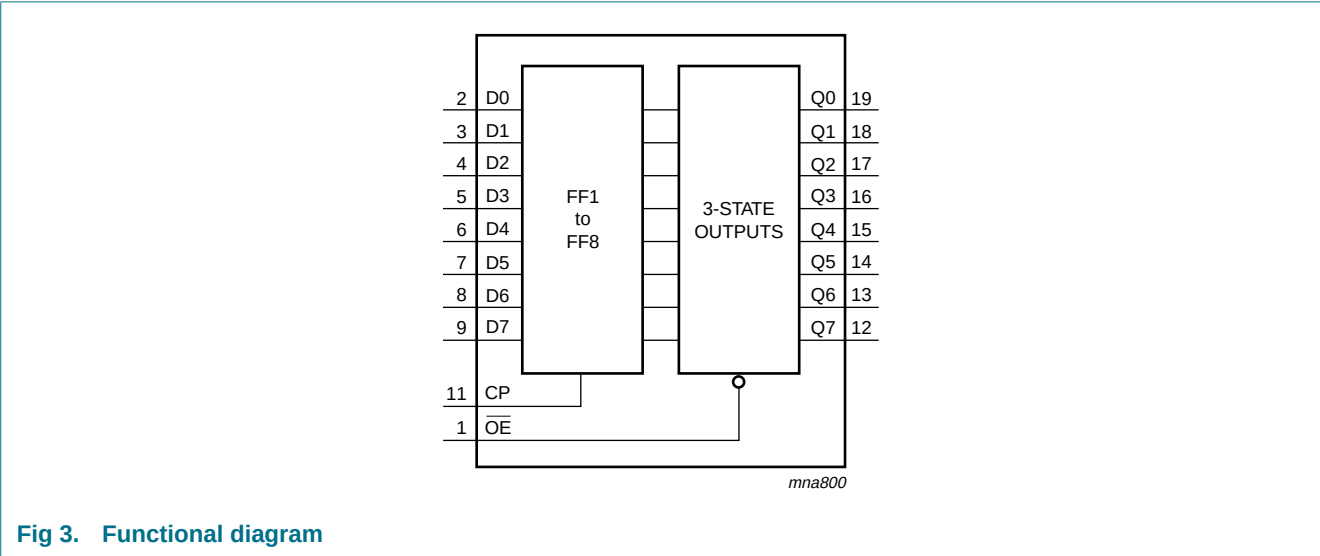
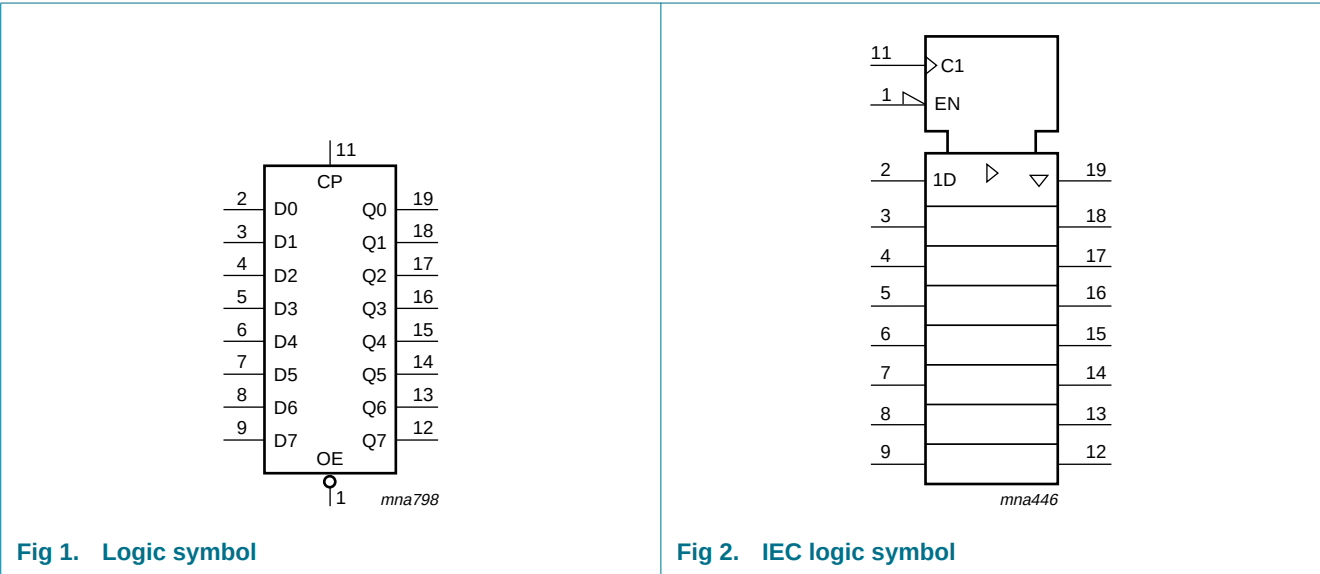
- Wide supply voltage range from 1.65 V to 3.6 V
- 3.6 V tolerant inputs/outputs
- CMOS low power consumption
- Direct interface with TTL levels (2.7 V to 3.6 V)
- Power-down mode
- Latch-up performance exceeds 250 mA
- Complies with JEDEC standards:
  - ◆ JESD8-7 (1.65 V to 1.95 V)
  - ◆ JESD8-5 (2.3 V to 2.7 V)
  - ◆ JESD8B/JESD36 (2.7 V to 3.6 V)
- ESD protection:
  - ◆ HBM JESD22-A114E exceeds 2000 V
  - ◆ MM JESD22-A115A exceeds 200 V

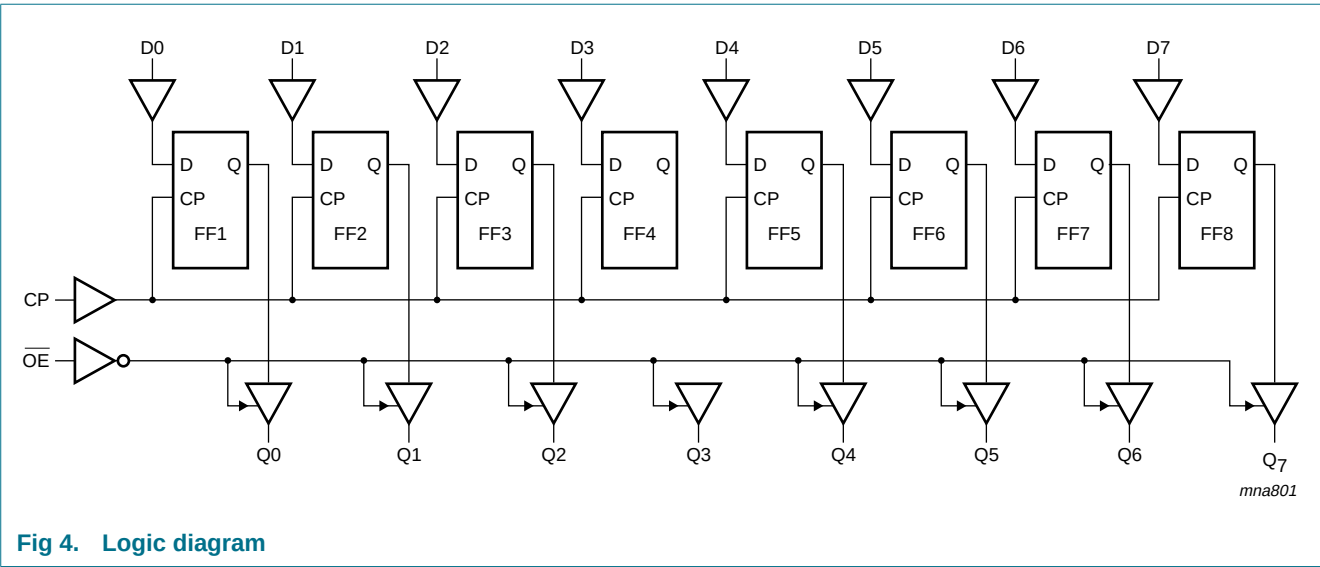
3. Ordering information

Table 1. Ordering information

| Type number | Package           |          |                                                                                                                                      |          |
|-------------|-------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------|----------|
|             | Temperature range | Name     | Description                                                                                                                          | Version  |
| 74ALVC574D  | −40 °C to +85 °C  | SO20     | plastic small outline package; 20 leads;<br>body width 7.5 mm                                                                        | SOT163-1 |
| 74ALVC574PW | −40 °C to +85 °C  | TSSOP20  | plastic thin shrink small outline package; 20 leads;<br>body width 4.4 mm                                                            | SOT360-1 |
| 74ALVC574BQ | −40 °C to +85 °C  | DHVQFN20 | plastic dual in-line compatible thermal enhanced very<br>thin quad flat package; no leads; 20 terminals;<br>body 2.5 × 4.5 × 0.85 mm | SOT764-1 |

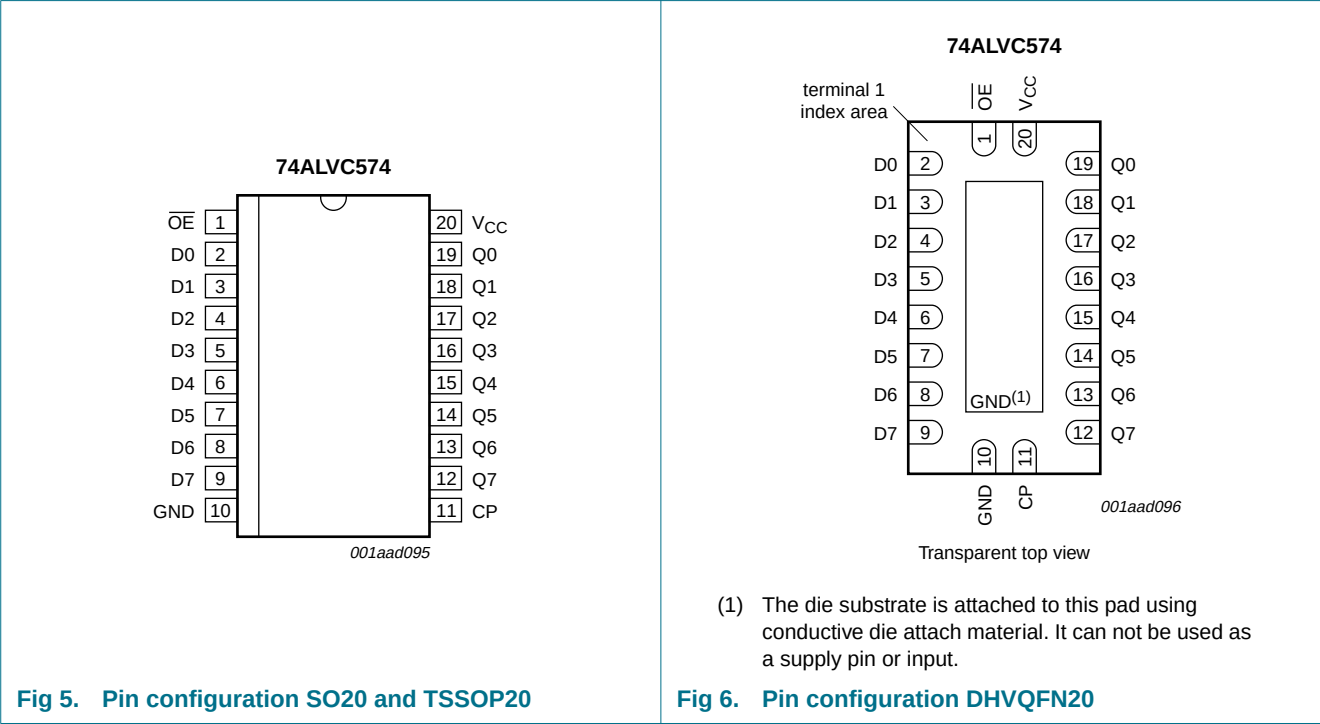
4. Functional diagram





5. Pinning information

5.1 Pinning



5.2 Pin description

Table 2. Pin description

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

## 6. Functional description

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

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

- [1] H = HIGH voltage level  
 h = HIGH voltage level one set-up time prior to the LOW to HIGH CP transition  
 L = LOW voltage level  
 l = LOW voltage level one set-up time prior to the LOW to HIGH 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 | +4.6           | V    |
| $I_{IK}$  | input clamping current  | $V_I < 0$ V                                    | -50  | -              | mA   |
| $V_I$     | input voltage           |                                                | -0.5 | +4.6           | V    |
| $I_{OK}$  | output clamping current | $V_O > V_{CC}$ or $V_O < 0$ V                  | -    | ±50            | mA   |
| $V_O$     | output voltage          | output HIGH or LOW state <sup>[1] [2]</sup>    | -0.5 | $V_{CC} + 0.5$ | V    |
|           |                         | output 3-state                                 | -0.5 | +4.6           | V    |
|           |                         | power-down mode, $V_{CC} = 0$ V <sup>[2]</sup> | -0.5 | +4.6           | V    |
| $I_O$     | output current          | $V_O = 0$ V to $V_{CC}$                        | -    | ±50            | mA   |
| $I_{CC}$  | supply current          |                                                | -    | 100            | mA   |
| $I_{GND}$ | ground current          |                                                | -100 | -              | mA   |
| $T_{stg}$ | storage temperature     |                                                | -65  | +150           | °C   |
| $P_{tot}$ | total power dissipation | $T_{amb} = -40$ °C to +85 °C <sup>[3]</sup>    | -    | 500            | mW   |

- [1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.  
 [2] When  $V_{CC} = 0$  V (power-down mode), the output voltage can be 3.6 V in normal operation.  
 [3] For SO20 packages: above 70 °C derate linearly with 8 mW/K.  
 For TSSOP20 packages: above 60 °C derate linearly with 5.5 mW/K.  
 For DHVQFN20 packages: above 60 °C derate linearly with 4.5 mW/K.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

| Symbol              | Parameter                           | Conditions                      | Min  | Max      | Unit |
|---------------------|-------------------------------------|---------------------------------|------|----------|------|
| $V_{CC}$            | supply voltage                      |                                 | 1.65 | 3.6      | V    |
| $V_I$               | input voltage                       |                                 | 0    | 3.6      | V    |
| $V_O$               | output voltage                      | output HIGH or LOW state        | 0    | $V_{CC}$ | V    |
|                     |                                     | output 3-state                  | 0    | 3.6      | V    |
|                     |                                     | power-down mode; $V_{CC} = 0$ V | 0    | 3.6      | V    |
| $T_{amb}$           | ambient temperature                 | in free air                     | -40  | +85      | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 1.65$ V to 2.7 V      | 0    | 20       | ns/V |
|                     |                                     | $V_{CC} = 2.7$ V to 3.6 V       | 0    | 10       | ns/V |

## 9. Static characteristics

**Table 6. Static characteristics**

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

| Symbol   | Parameter                 | Conditions                                       | -40 °C to +85 °C     |                    |                      | Unit    |
|----------|---------------------------|--------------------------------------------------|----------------------|--------------------|----------------------|---------|
|          |                           |                                                  | Min                  | Typ <sup>[1]</sup> | Max                  |         |
| $V_{IH}$ | HIGH-level input voltage  | $V_{CC} = 1.65$ V to 1.95 V                      | $0.65 \times V_{CC}$ | -                  | -                    | V       |
|          |                           | $V_{CC} = 2.3$ V to 2.7 V                        | 1.7                  | -                  | -                    | V       |
|          |                           | $V_{CC} = 2.7$ V to 3.6 V                        | 2.0                  | -                  | -                    | V       |
| $V_{IL}$ | LOW-level input voltage   | $V_{CC} = 1.65$ V to 1.95 V                      | -                    | -                  | $0.35 \times V_{CC}$ | V       |
|          |                           | $V_{CC} = 2.3$ V to 2.7 V                        | -                    | -                  | 0.7                  | V       |
|          |                           | $V_{CC} = 2.7$ V to 3.6 V                        | -                    | -                  | 0.8                  | V       |
| $V_{OH}$ | HIGH-level output voltage | $V_I = V_{IH}$ or $V_{IL}$                       |                      |                    |                      |         |
|          |                           | $I_O = -100$ $\mu$ A; $V_{CC} = 1.65$ V to 3.6 V | $V_{CC} - 0.2$       | -                  | -                    | V       |
|          |                           | $I_O = -6$ mA; $V_{CC} = 1.65$ V                 | 1.25                 | 1.51               | -                    | V       |
|          |                           | $I_O = -12$ mA; $V_{CC} = 2.3$ V                 | 1.8                  | 2.10               | -                    | V       |
|          |                           | $I_O = -18$ mA; $V_{CC} = 2.3$ V                 | 1.7                  | 2.01               | -                    | V       |
|          |                           | $I_O = -12$ mA; $V_{CC} = 2.7$ V                 | 2.2                  | 2.53               | -                    | V       |
|          |                           | $I_O = -18$ mA; $V_{CC} = 3.0$ V                 | 2.4                  | 2.76               | -                    | V       |
|          |                           | $I_O = -24$ mA; $V_{CC} = 3.0$ V                 | 2.2                  | 2.68               | -                    | V       |
| $V_{OL}$ | LOW-level output voltage  | $V_I = V_{IH}$ or $V_{IL}$                       |                      |                    |                      |         |
|          |                           | $I_O = 100$ $\mu$ A; $V_{CC} = 1.65$ V to 3.6 V  | -                    | -                  | 0.2                  | V       |
|          |                           | $I_O = 6$ mA; $V_{CC} = 1.65$ V                  | -                    | 0.11               | 0.3                  | V       |
|          |                           | $I_O = 12$ mA; $V_{CC} = 2.3$ V                  | -                    | 0.17               | 0.4                  | V       |
|          |                           | $I_O = 18$ mA; $V_{CC} = 2.3$ V                  | -                    | 0.25               | 0.6                  | V       |
|          |                           | $I_O = 12$ mA; $V_{CC} = 2.7$ V                  | -                    | 0.16               | 0.4                  | V       |
|          |                           | $I_O = 18$ mA; $V_{CC} = 3.0$ V                  | -                    | 0.23               | 0.4                  | V       |
|          |                           | $I_O = 24$ mA; $V_{CC} = 3.0$ V                  | -                    | 0.30               | 0.55                 | V       |
| $I_I$    | input leakage current     | $V_{CC} = 3.6$ V; $V_I = 3.6$ V or GND           | -                    | $\pm 0.1$          | $\pm 5$              | $\mu$ A |

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

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

| Symbol          | Parameter                 | Conditions                                                                        | –40 °C to +85 °C |                    |          | Unit    |
|-----------------|---------------------------|-----------------------------------------------------------------------------------|------------------|--------------------|----------|---------|
|                 |                           |                                                                                   | Min              | Typ <sup>[1]</sup> | Max      |         |
| $I_{OZ}$        | OFF-state output current  | $V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 1.65$ V to 3.6 V;<br>$V_O = 3.6$ V or GND; | -                | $\pm 0.1$          | $\pm 10$ | $\mu$ A |
| $I_{OFF}$       | power-off leakage current | $V_{CC} = 0$ V; $V_I$ or $V_O = 0$ V to 3.6 V                                     | -                | $\pm 0.1$          | $\pm 10$ | $\mu$ A |
| $I_{CC}$        | supply current            | $V_{CC} = 3.6$ V; $V_I = V_{CC}$ or GND;<br>$I_O = 0$ A                           | -                | 0.2                | 10       | $\mu$ A |
| $\Delta I_{CC}$ | additional supply current | per input pin; $V_{CC} = 3.0$ V to 3.6 V;<br>$V_I = V_{CC} - 0.6$ V; $I_O = 0$ A  | -                | 5                  | 750      | $\mu$ A |
| $C_I$           | input capacitance         |                                                                                   | -                | 3.5                | -        | pF      |

[1] All typical values are measured at  $V_{CC} = 3.3$  V (unless stated otherwise) and  $T_{amb} = 25$  °C.

## 10. Dynamic characteristics

**Table 7.** Dynamic characteristicsVoltages are referenced to GND (ground = 0 V). For test circuit see [Figure 10](#).

| Symbol    | Parameter         | Conditions                                                         | –40 °C to +85 °C |                    |     | Unit |
|-----------|-------------------|--------------------------------------------------------------------|------------------|--------------------|-----|------|
|           |                   |                                                                    | Min              | Typ <sup>[1]</sup> | Max |      |
| $t_{pd}$  | propagation delay | CP to Qn; see <a href="#">Figure 7</a> <sup>[2]</sup>              |                  |                    |     |      |
|           |                   | $V_{CC} = 1.65$ V to 1.95 V                                        | 1.0              | 3.1                | 6.4 | ns   |
|           |                   | $V_{CC} = 2.3$ V to 2.7 V                                          | 1.0              | 2.3                | 3.9 | ns   |
|           |                   | $V_{CC} = 2.7$ V                                                   | 1.0              | 2.5                | 3.6 | ns   |
|           |                   | $V_{CC} = 3.0$ V to 3.6 V                                          | 1.0              | 2.5                | 3.6 | ns   |
| $t_{en}$  | enable time       | $\overline{OE}$ to Qn; see <a href="#">Figure 8</a> <sup>[2]</sup> |                  |                    |     |      |
|           |                   | $V_{CC} = 1.65$ V to 1.95 V                                        | 1.0              | 3.2                | 6.4 | ns   |
|           |                   | $V_{CC} = 2.3$ V to 2.7 V                                          | 1.0              | 2.6                | 4.5 | ns   |
|           |                   | $V_{CC} = 2.7$ V                                                   | 1.0              | 3.2                | 4.6 | ns   |
|           |                   | $V_{CC} = 3.0$ V to 3.6 V                                          | 1.0              | 2.4                | 4.0 | ns   |
| $t_{dis}$ | disable time      | $\overline{OE}$ to Qn; see <a href="#">Figure 8</a> <sup>[2]</sup> |                  |                    |     |      |
|           |                   | $V_{CC} = 1.65$ V to 1.95 V                                        | 1.5              | 3.6                | 7.0 | ns   |
|           |                   | $V_{CC} = 2.3$ V to 2.7 V                                          | 1.0              | 2.3                | 4.4 | ns   |
|           |                   | $V_{CC} = 2.7$ V                                                   | 1.5              | 2.9                | 4.4 | ns   |
|           |                   | $V_{CC} = 3.0$ V to 3.6 V                                          | 1.0              | 2.8                | 4.4 | ns   |
| $t_W$     | pulse width       | clock HIGH or LOW; see <a href="#">Figure 7</a>                    |                  |                    |     |      |
|           |                   | $V_{CC} = 1.65$ V to 1.95 V                                        | 3.8              | 1.1                | -   | ns   |
|           |                   | $V_{CC} = 2.3$ V to 2.7 V                                          | 3.3              | 0.9                | -   | ns   |
|           |                   | $V_{CC} = 2.7$ V                                                   | 3.3              | 0.8                | -   | ns   |
|           |                   | $V_{CC} = 3.0$ V to 3.6 V                                          | 3.3              | 1.2                | -   | ns   |

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

Voltages are referenced to GND (ground = 0 V). For test circuit see [Figure 10](#).

| Symbol           | Parameter                     | Conditions                                                                                      | –40 °C to +85 °C |                    |     | Unit |
|------------------|-------------------------------|-------------------------------------------------------------------------------------------------|------------------|--------------------|-----|------|
|                  |                               |                                                                                                 | Min              | Typ <sup>[1]</sup> | Max |      |
| t <sub>su</sub>  | set-up time                   | Dn to CP; see <a href="#">Figure 9</a>                                                          |                  |                    |     |      |
|                  |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                                                              | 0.8              | –0.1               | -   | ns   |
|                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                                                                | 0.8              | 0.1                | -   | ns   |
|                  |                               | V <sub>CC</sub> = 2.7 V                                                                         | 0.8              | 0.3                | -   | ns   |
| t <sub>h</sub>   | hold time                     | Dn to CP; see <a href="#">Figure 9</a>                                                          |                  |                    |     |      |
|                  |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                                                              | 0.8              | –0.1               | -   | ns   |
|                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                                                                | 0.8              | 0.1                | -   | ns   |
|                  |                               | V <sub>CC</sub> = 2.7 V                                                                         | 0.8              | 0.4                | -   | ns   |
| f <sub>max</sub> | maximum frequency             | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                | 0.7              | –0.1               | -   | ns   |
|                  |                               | see <a href="#">Figure 7</a>                                                                    |                  |                    |     |      |
|                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                                                                | 100              | 200                | -   | MHz  |
|                  |                               | V <sub>CC</sub> = 2.7 V                                                                         | 100              | 200                | -   | MHz  |
| C <sub>PD</sub>  | power dissipation capacitance | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                | 150              | 300                | -   | MHz  |
|                  |                               | per flip-flop; V <sub>I</sub> = GND to V <sub>CC</sub> ; V <sub>CC</sub> = 3.3 V <sup>[3]</sup> |                  |                    |     |      |
|                  |                               | outputs HIGH or LOW state                                                                       | -                | 21                 | -   | pF   |
|                  |                               | outputs 3-state                                                                                 | -                | 13                 | -   | pF   |

[1] Typical values are measured at T<sub>amb</sub> = 25 °C

[2] t<sub>pd</sub> is the same as t<sub>PHL</sub> and t<sub>PLH</sub>.

t<sub>en</sub> is the same as t<sub>PZH</sub> and t<sub>PZL</sub>.

t<sub>dis</sub> is the same as t<sub>PHZ</sub> and t<sub>PLZ</sub>.

[3] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).

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

f<sub>i</sub> = input frequency in MHz; f<sub>o</sub> = output frequency in MHz

C<sub>L</sub> = output load capacitance in pF

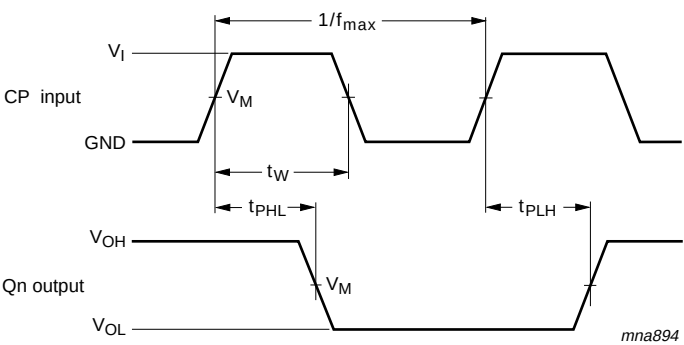
V<sub>CC</sub> = supply voltage in Volts

N = number of inputs switching

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



11. Waveforms

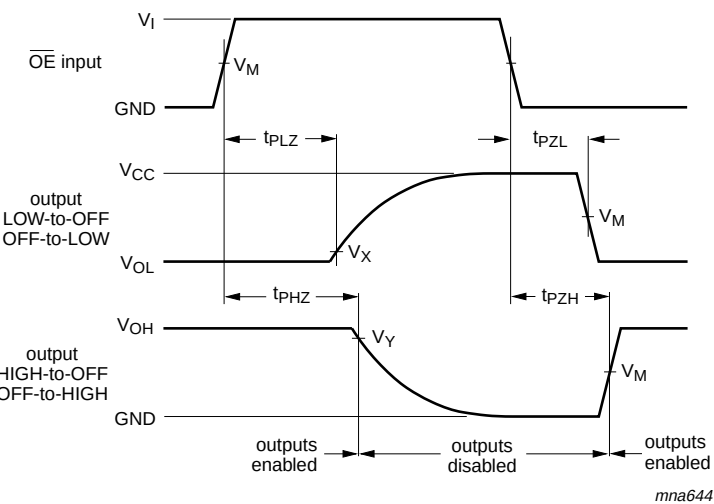


Measurement points are given in [Table 8](#).  
VOL and VOH are the typical output voltage levels that occur with the output load.

Fig 7. Clock (CP) to output (Qn) propagation delays, the clock pulse width, and the maximum frequency

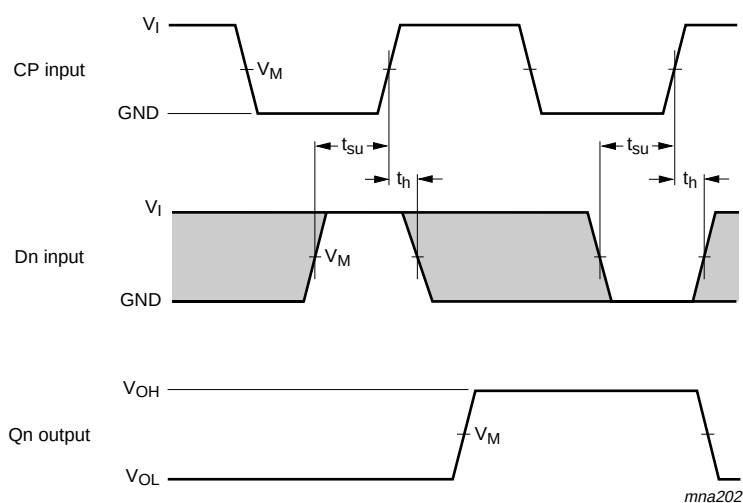
Table 8. Measurement points

| Supply voltage   | Input  | Output |              |              |
|------------------|--------|--------|--------------|--------------|
| VCC              | VM     | VM     | VX           | VY           |
| 1.65 V to 1.95 V | 0.5VCC | 0.5VCC | VOL + 0.15 V | VOH – 0.15 V |
| 2.3 V to 2.7 V   | 0.5VCC | 0.5VCC | VOL + 0.15 V | VOH – 0.15 V |
| 2.7 V            | 1.5 V  | 1.5 V  | VOL + 0.3 V  | VOH – 0.3 V  |
| 3.0 V to 3.6 V   | 1.5 V  | 1.5 V  | VOL + 0.3 V  | VOH – 0.3 V  |



Measurement points are given in [Table 8](#).  
VOL and VOH are the typical output voltage levels that occur with the output load.

Fig 8. Enable and disable times

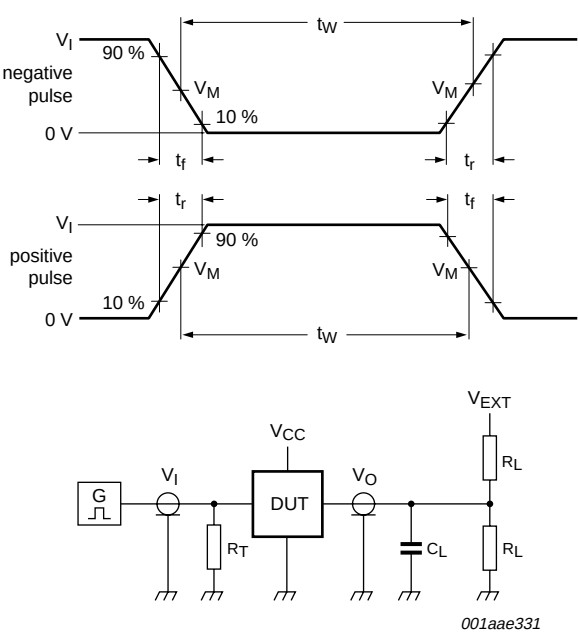


Measurement points are given in [Table 8](#).

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

The shaded areas indicate when the input is permitted to change for predictable output performance.

**Fig 9. Data set-up and hold times for the Dn input to the CP input**



Test data is given in [Table 9](#).  
Definitions for test circuit:  
 $R_L$  = Load resistance.  
 $C_L$  = Load capacitance including jig and probe capacitance.  
 $R_T$  = Termination resistance should be equal to output impedance  $Z_o$  of the pulse generator.  
 $V_{EXT}$  = External voltage for measuring switching times.

Fig 10. Test circuit for switching times

Table 9. Test data

| Supply voltage   | Input    |               | Load  |              | $V_{EXT}$          |                    |                    |
|------------------|----------|---------------|-------|--------------|--------------------|--------------------|--------------------|
|                  | $V_I$    | $t_r, t_f$    | $C_L$ | $R_L$        | $t_{PLH}, t_{PHL}$ | $t_{PLZ}, t_{PZL}$ | $t_{PHZ}, t_{PZH}$ |
| 1.65 V to 1.95 V | $V_{CC}$ | $\leq 2.0$ ns | 30 pF | 1 k $\Omega$ | open               | $2V_{CC}$          | GND                |
| 2.3 V to 2.7 V   | $V_{CC}$ | $\leq 2.0$ ns | 30 pF | 500 $\Omega$ | open               | $2V_{CC}$          | GND                |
| 2.7 V            | 2.7 V    | $\leq 2.5$ ns | 50 pF | 500 $\Omega$ | open               | 6 V                | GND                |
| 3.0 V to 3.6 V   | 2.7 V    | $\leq 2.5$ ns | 50 pF | 500 $\Omega$ | open               | 6 V                | GND                |

12. Package outline

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

SOT163-1

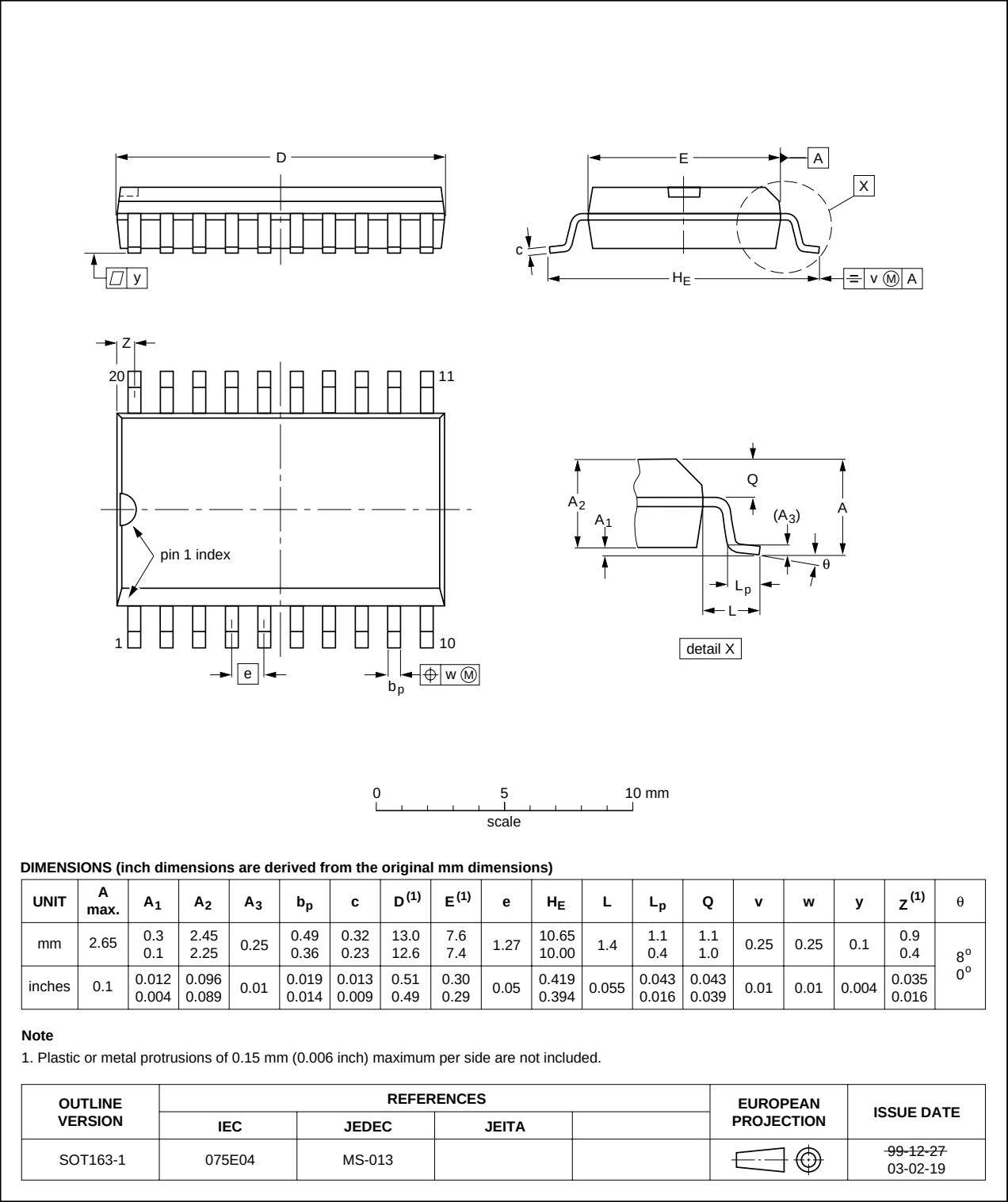


Fig 11. Package outline SOT163-1 (SO20)

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

SOT360-1

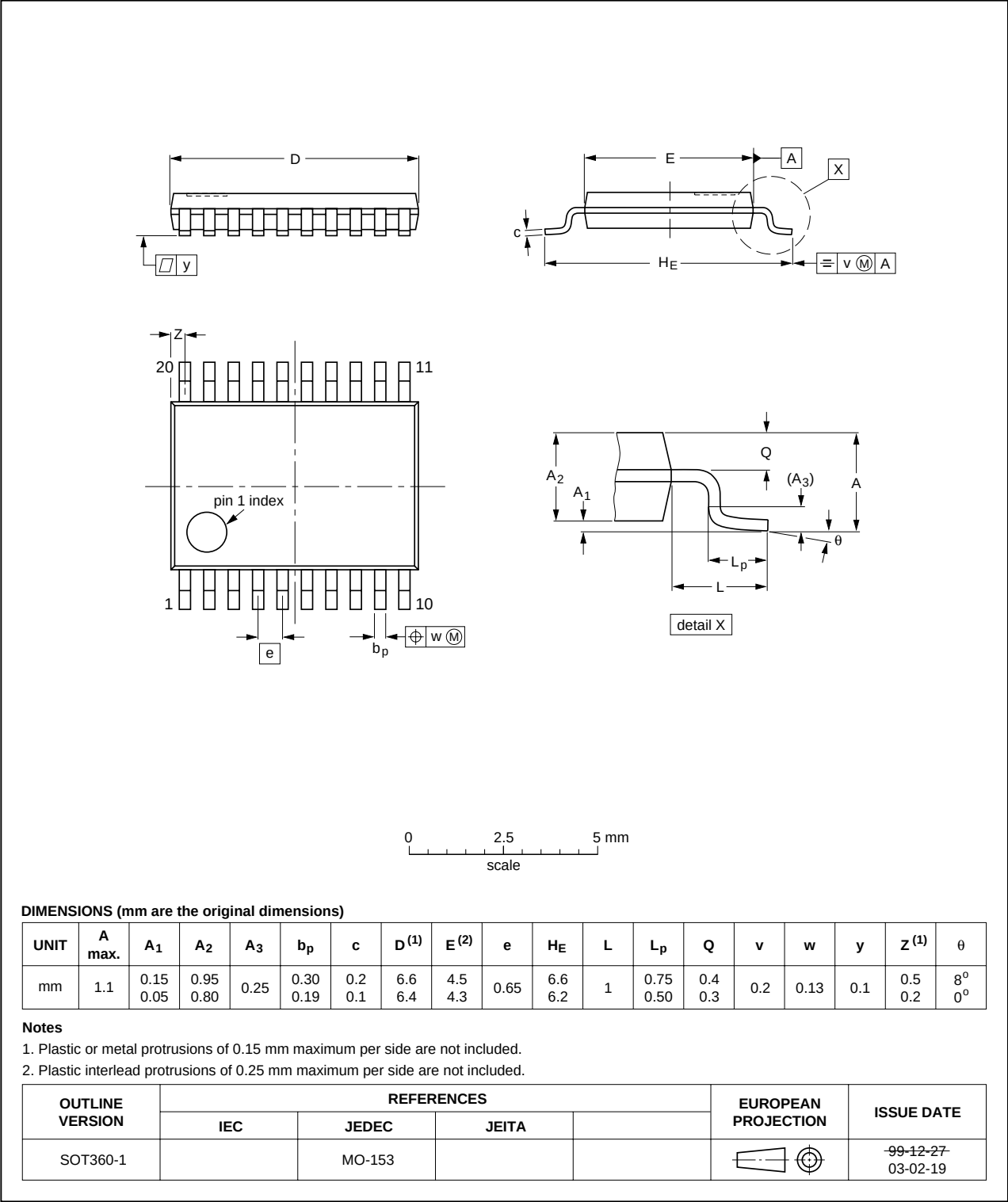


Fig 12. Package outline SOT360-1 (TSSOP20)

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

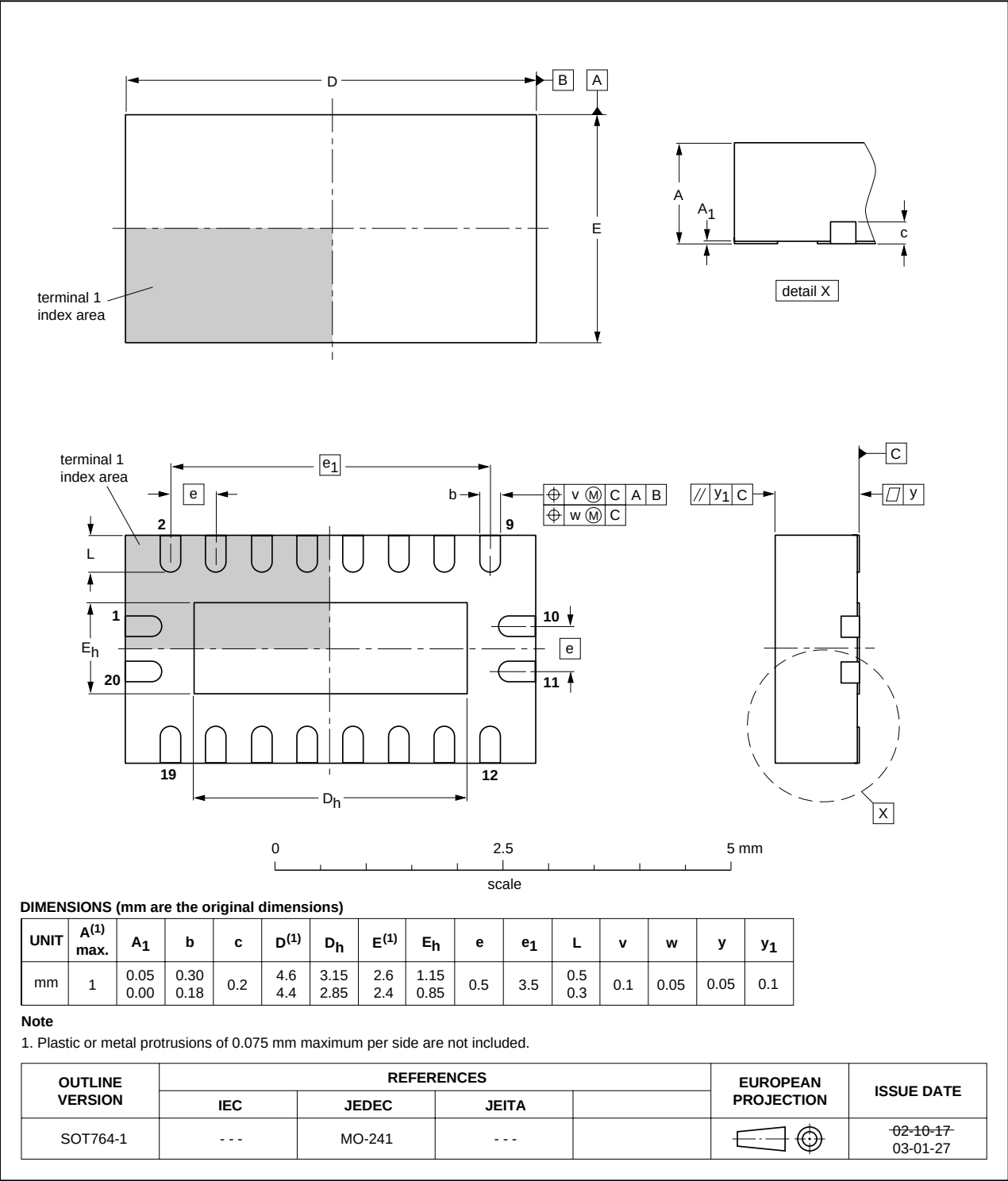


Fig 13. Package outline SOT764-1 (DHVQFN20)

## 13. Abbreviations

Table 10. Abbreviations

| Acronym | Description                 |
|---------|-----------------------------|
| CDM     | Charged Device Model        |
| DUT     | Device Under Test           |
| 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  |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|-------------|
| 74ALVC574_2    | 20071108                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Product data sheet    | -             | 74ALVC574_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 8</a>: derating values added for DHVQFN20 package.</li><li>• <a href="#">Section 12</a>: outline drawing added for DHVQFN20 package.</li></ul> |                       |               |             |
| 74ALVC574_1    | 20020304                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Product specification | -             | -           |

## 15. Legal information

### 15.1 Data sheet status

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

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

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

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

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