

# 74AHC273; 74AHCT273

Octal D-type flip-flop with reset; positive-edge trigger

Rev. 03 — 13 May 2008

Product data sheet

## 1. General description

The 74AHC273; 74AHCT273 is a high-speed Si-gate CMOS device and is pin compatible with Low-power Schottky TTL (LSTTL). It is specified in compliance with JEDEC standard No. 7-A.

The 74AHC273; 74AHCT273 has eight edge-triggered, D-type flip-flops with individual D inputs and Q outputs.

The common clock (CP) and master reset ( $\overline{MR}$ ) inputs, load and reset (clear) all flip-flops simultaneously.

The state of each D input, one set-up time before the LOW-to-HIGH clock transition, is transferred to the corresponding output (Q<sub>n</sub>) of the flip-flop.

All outputs will be forced LOW, independent of clock or data inputs, by a LOW on the  $\overline{MR}$  input.

The device is useful for applications where only the true output is required and the clock and master reset are common to all storage elements.

## 2. Features

- Balanced propagation delays
- All inputs have Schmitt-trigger actions
- Inputs accept voltages higher than V<sub>CC</sub>
- Ideal buffer for MOS microcontroller or memory
- Common clock and master reset
- Related product versions:
  - ◆ 74AHC377; 74AHCT377 for clock enable version
  - ◆ 74AHC373; 74AHCT373 for transparent latch version
  - ◆ 74AHC374; 74AHCT374 for 3-state version
- Input levels:
  - ◆ For 74AHC273: CMOS level
  - ◆ For 74AHCT273: TTL level
- ESD protection:
  - ◆ HBM EIA/JESD22-A114E exceeds 2000 V
  - ◆ MM EIA/JESD22-A115-A exceeds 200 V
  - ◆ CDM EIA/JESD22-C101C exceeds 1000 V
- Multiple package options
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C

### 3. Ordering information

Table 1. Ordering information

| Type number      | Package           |          |  | Version  |
|------------------|-------------------|----------|--|----------|
|                  | Temperature range | Name     | Description  |          |
| <b>74AHC273</b>  |                   |          |  |          |
| 74AHC273D        | -40 °C to +125 °C | SO20     | plastic small outline package; 20 leads; body width 7.5 mm   | SOT163-1 |
| 74AHC273PW       | -40 °C to +125 °C | TSSOP20  | plastic thin shrink small outline package; 20 leads; body width 4.4 mm   | SOT360-1 |
| 74AHC273BQ       | -40 °C to +125 °C | DHVQFN20 | plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 × 4.5 × 0.85 mm | SOT764-1 |
| <b>74AHCT273</b> |                   |          |  |          |
| 74AHCT273D       | -40 °C to +125 °C | SO20     | plastic small outline package; 20 leads; body width 7.5 mm   | SOT163-1 |
| 74AHCT273PW      | -40 °C to +125 °C | TSSOP20  | plastic thin shrink small outline package; 20 leads; body width 4.4 mm   | SOT360-1 |
| 74AHCT273BQ      | -40 °C to +125 °C | DHVQFN20 | plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 × 4.5 × 0.85 mm | SOT764-1 |

### 4. Functional diagram

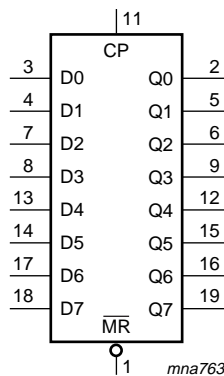


Fig 1. Logic symbol

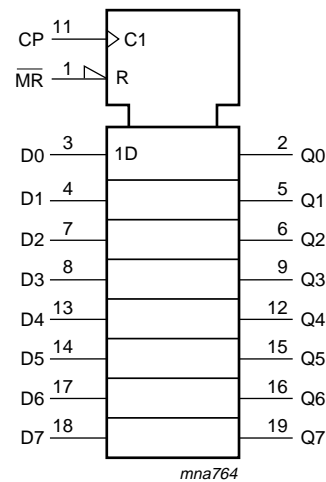


Fig 2. IEC logic symbol

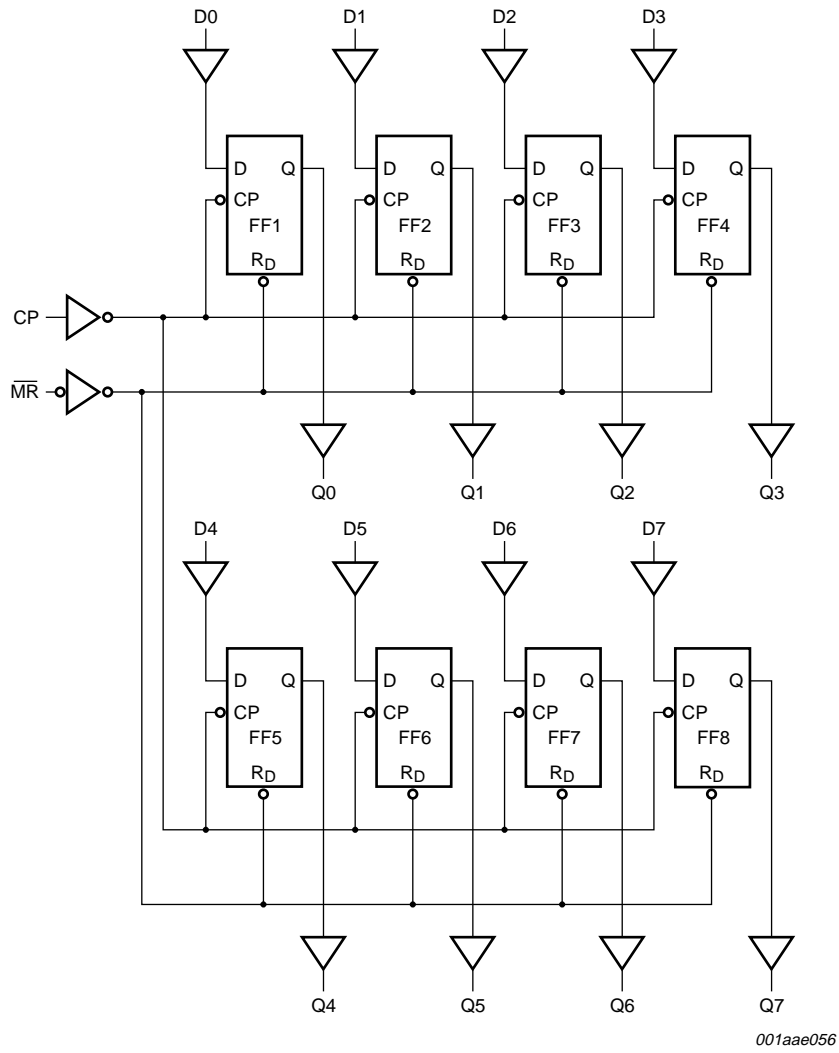


Fig 3. Logic diagram

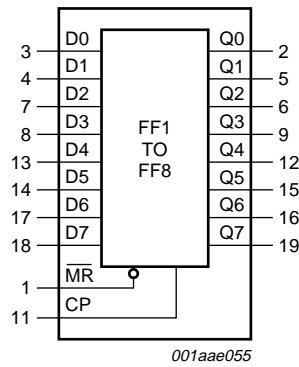
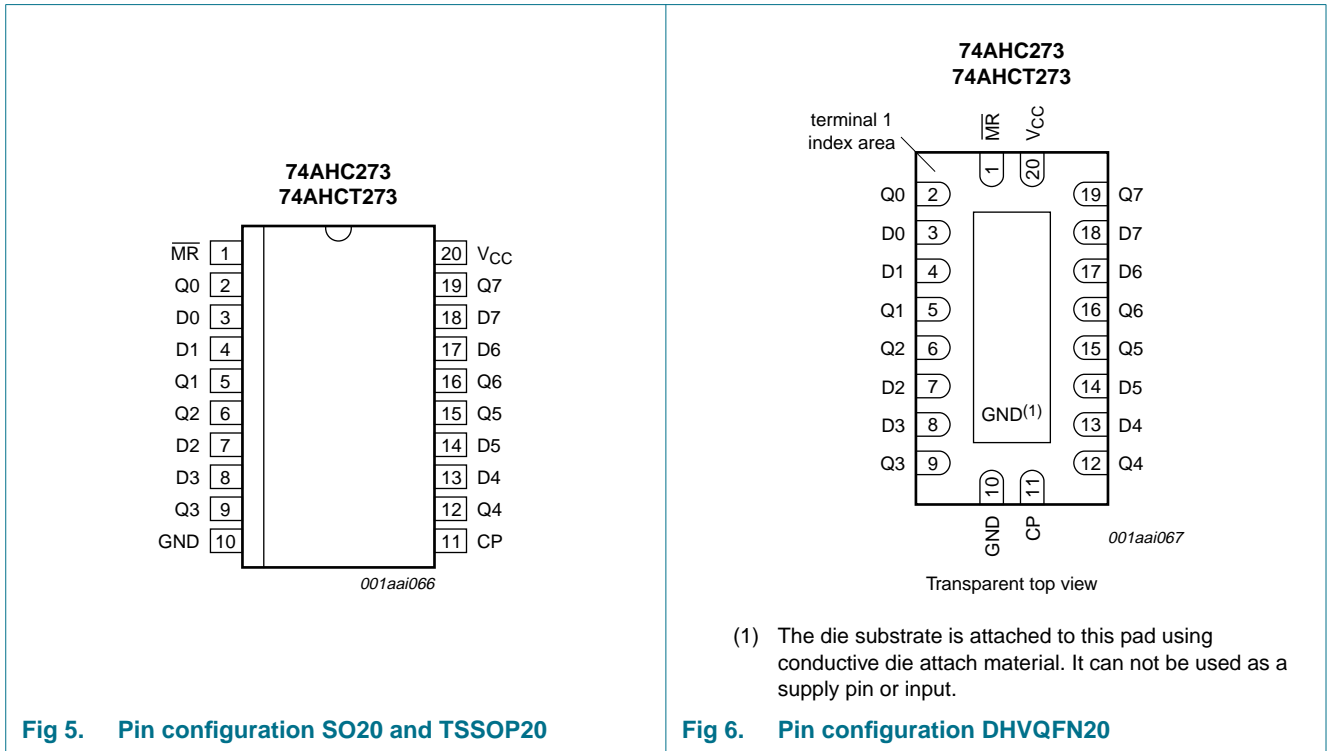


Fig 4. Functional diagram

## 5. Pinning information

### 5.1 Pinning



### 5.2 Pin description

Table 2. Pin description

| Symbol          | Pin | Description                              |
|-----------------|-----|--|
| $\overline{MR}$ | 1   | master reset input (active LOW)          |
| Q0              | 2   | flip-flop output                         |
| D0              | 3   | data input                               |
| D1              | 4   | data input                               |
| Q1              | 5   | flip-flop output                         |
| Q2              | 6   | flip-flop output                         |
| D2              | 7   | data input                               |
| D3              | 8   | data input                               |
| Q3              | 9   | flip-flop output                         |
| GND             | 10  | ground (0 V)                             |
| CP              | 11  | clock input (LOW-to-HIGH edge-triggered) |
| Q4              | 12  | flip-flop output                         |
| D4              | 13  | data input                               |
| D5              | 14  | data input                               |
| Q5              | 15  | flip-flop output                         |
| Q6              | 16  | flip-flop output                         |

Table 2. Pin description ...continued

| Symbol          | Pin | Description      |
|-----------------|-----|------------------|
| D6              | 17  | data input       |
| D7              | 18  | data input       |
| Q7              | 19  | flip-flop output |
| V <sub>CC</sub> | 20  | supply voltage   |

## 6. Functional description

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

| Operating mode | Control |    | Input | Output |
|----------------|---------|----|-------|--------|
|                | MR      | CP | Dn    | Qn     |
| Reset (clear)  | L       | X  | X     | L      |
| Load '1'       | H       | ↑  | h     | H      |
| Load '0'       | H       | ↑  | l     | L      |

- [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;  
 ↑ = LOW-to-HIGH;  
 X = don't care.

## 7. Limiting values

Table 4. Limiting values

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

| Symbol           | Parameter               | Conditions  | Min                | Max  | Unit |
|------------------|-------------------------|---|--------------------|------|------|
| V <sub>CC</sub>  | supply voltage          |   | -0.5               | +7.0 | V    |
| V <sub>I</sub>   | input voltage           |   | -0.5               | +7.0 | V    |
| I <sub>IK</sub>  | input clamping current  | V <sub>I</sub> < -0.5 V   | <sup>[1]</sup> -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 | <sup>[1]</sup> -20 | +20  | mA   |
| I <sub>O</sub>   | output current          | V <sub>O</sub> = -0.5 V to (V <sub>CC</sub> + 0.5 V)                | -25                | +25  | mA   |
| I <sub>CC</sub>  | supply current          |   | -                  | +75  | mA   |
| I <sub>GND</sub> | ground current          |   | -75                | -    | mA   |
| T <sub>stg</sub> | storage temperature     |   | -65                | +150 | °C   |
| P <sub>tot</sub> | total power dissipation | T <sub>amb</sub> = -40 °C to +125 °C                                | <sup>[2]</sup> -   | 500  | mW   |

- [1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.  
 [2] For SO20 packages: above 70 °C the value of P<sub>tot</sub> derates linearly at 8 mW/K.  
 For TSSOP20 packages: above 60 °C the value of P<sub>tot</sub> derates linearly at 5.5 mW/K.  
 For DHVQFN20 packages: above 60 °C the value of P<sub>tot</sub> derates linearly at 4.5 mW/K.

## 8. Recommended operating conditions

Table 5. Operating conditions

| Symbol              | Parameter                           | Conditions                              | Min | Typ | Max      | Unit |
|---------------------|-------------------------------------|---|-----|-----|----------|------|
| <b>74AHC273</b>     |                                     |   |     |     |          |      |
| $V_{CC}$            | supply voltage                      |   | 2.0 | 5.0 | 5.5      | V    |
| $V_I$               | input voltage                       |   | 0   | -   | 5.5      | V    |
| $V_O$               | output voltage                      |   | 0   | -   | $V_{CC}$ | V    |
| $T_{amb}$           | ambient temperature                 |   | -40 | +25 | +125     | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | -   | -   | 100      | ns/V |
|                     |                                     | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ | -   | -   | 20       | ns/V |
| <b>74AHCT273</b>    |                                     |   |     |     |          |      |
| $V_{CC}$            | supply voltage                      |   | 4.5 | 5.0 | 5.5      | V    |
| $V_I$               | input voltage                       |   | 0   | -   | 5.5      | V    |
| $V_O$               | output voltage                      |   | 0   | -   | $V_{CC}$ | V    |
| $T_{amb}$           | ambient temperature                 |   | -40 | +25 | +125     | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ | -   | -   | 20       | ns/V |

## 9. Static characteristics

Table 6. Static characteristics

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

| Symbol          | Parameter                 | Conditions                                      | 25 °C |     |      | -40 °C to +85 °C |      | -40 °C to +125 °C |      | Unit |
|-----------------|---------------------------|---|-------|-----|------|------------------|------|-------------------|------|------|
|                 |                           |   | Min   | Typ | Max  | Min              | Max  | Min               | Max  |      |
| <b>74AHC273</b> |                           |   |       |     |      |                  |      |                   |      |      |
| $V_{IH}$        | HIGH-level input voltage  | $V_{CC} = 2.0\text{ V}$                         | 1.5   | -   | -    | 1.5              | -    | 1.5               | -    | V    |
|                 |                           | $V_{CC} = 3.0\text{ V}$                         | 2.1   | -   | -    | 2.1              | -    | 2.1               | -    | V    |
|                 |                           | $V_{CC} = 5.5\text{ V}$                         | 3.85  | -   | -    | 3.85             | -    | 3.85              | -    | V    |
| $V_{IL}$        | LOW-level input voltage   | $V_{CC} = 2.0\text{ V}$                         | -     | -   | 0.5  | -                | 0.5  | -                 | 0.5  | V    |
|                 |                           | $V_{CC} = 3.0\text{ V}$                         | -     | -   | 0.9  | -                | 0.9  | -                 | 0.9  | V    |
|                 |                           | $V_{CC} = 5.5\text{ V}$                         | -     | -   | 1.65 | -                | 1.65 | -                 | 1.65 | V    |
| $V_{OH}$        | HIGH-level output voltage | $V_I = V_{IH}$ or $V_{IL}$                      |       |     |      |                  |      |                   |      |      |
|                 |                           | $I_O = -50\ \mu\text{A}; V_{CC} = 2.0\text{ V}$ | 1.9   | 2.0 | -    | 1.9              | -    | 1.9               | -    | V    |
|                 |                           | $I_O = -50\ \mu\text{A}; V_{CC} = 3.0\text{ V}$ | 2.9   | 3.0 | -    | 2.9              | -    | 2.9               | -    | V    |
|                 |                           | $I_O = -50\ \mu\text{A}; V_{CC} = 4.5\text{ V}$ | 4.4   | 4.5 | -    | 4.4              | -    | 4.4               | -    | V    |
|                 |                           | $I_O = -4.0\text{ mA}; V_{CC} = 3.0\text{ V}$   | 2.58  | -   | -    | 2.48             | -    | 2.40              | -    | V    |
|                 |                           | $I_O = -8.0\text{ mA}; V_{CC} = 4.5\text{ V}$   | 3.94  | -   | -    | 3.80             | -    | 3.70              | -    | V    |
| $V_{OL}$        | LOW-level output voltage  | $V_I = V_{IH}$ or $V_{IL}$                      |       |     |      |                  |      |                   |      |      |
|                 |                           | $I_O = 50\ \mu\text{A}; V_{CC} = 2.0\text{ V}$  | -     | 0   | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                 |                           | $I_O = 50\ \mu\text{A}; V_{CC} = 3.0\text{ V}$  | -     | 0   | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                 |                           | $I_O = 50\ \mu\text{A}; V_{CC} = 4.5\text{ V}$  | -     | 0   | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                 |                           | $I_O = 4.0\text{ mA}; V_{CC} = 3.0\text{ V}$    | -     | -   | 0.36 | -                | 0.44 | -                 | 0.55 | V    |
|                 |                           | $I_O = 8.0\text{ mA}; V_{CC} = 4.5\text{ V}$    | -     | -   | 0.36 | -                | 0.44 | -                 | 0.55 | V    |

**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  |               |
| $I_I$            | input leakage current     | $V_I = 5.5 \text{ V}$ or GND;<br>$V_{CC} = 0 \text{ V}$ to 5.5 V  | -     | -   | 0.1  | -                | 1.0  | -                 | 2.0  | $\mu\text{A}$ |
| $I_{CC}$         | supply current            | $V_I = V_{CC}$ or GND; $I_O = 0 \text{ A}$ ;<br>$V_{CC} = 5.5 \text{ V}$  | -     | -   | 4.0  | -                | 40   | -                 | 80   | $\mu\text{A}$ |
| $C_I$            | input capacitance         |   | -     | 3   | 10   | -                | 10   | -                 | 10   | pF            |
| $C_O$            | output capacitance        |   | -     | 4   | -    | -                | -    | -                 | -    | pF            |
| <b>74AHCT273</b> |                           |   |       |     |      |                  |      |                   |      |               |
| $V_{IH}$         | HIGH-level input voltage  | $V_{CC} = 4.5 \text{ V}$ to 5.5 V   | 2.0   | -   | -    | 2.0              | -    | 2.0               | -    | V             |
| $V_{IL}$         | LOW-level input voltage   | $V_{CC} = 4.5 \text{ V}$ to 5.5 V   | -     | -   | 0.8  | -                | 0.8  | -                 | 0.8  | V             |
| $V_{OH}$         | HIGH-level output voltage | $V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 4.5 \text{ V}$   |       |     |      |                  |      |                   |      |               |
|                  |                           | $I_O = -50 \mu\text{A}$   | 4.4   | -   | -    | 4.4              | -    | 4.4               | -    | V             |
|                  |                           | $I_O = -8.0 \text{ mA}$   | 3.94  | -   | -    | 3.80             | -    | 3.70              | -    | V             |
| $V_{OL}$         | LOW-level output voltage  | $V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 4.5 \text{ V}$   |       |     |      |                  |      |                   |      |               |
|                  |                           | $I_O = 50 \mu\text{A}$  | -     | 0   | 0.1  | -                | 0.1  | -                 | 0.1  | V             |
|                  |                           | $I_O = 8.0 \text{ mA}$  | -     | -   | 0.36 | -                | 0.44 | -                 | 0.55 | V             |
| $I_I$            | input leakage current     | $V_I = 5.5 \text{ V}$ or GND;<br>$V_{CC} = 0 \text{ V}$ to 5.5 V  | -     | -   | 0.1  | -                | 1.0  | -                 | 2.0  | $\mu\text{A}$ |
| $I_{CC}$         | supply current            | $V_I = V_{CC}$ or GND; $I_O = 0 \text{ A}$ ;<br>$V_{CC} = 5.5 \text{ V}$  | -     | -   | 4.0  | -                | 40   | -                 | 80   | $\mu\text{A}$ |
| $\Delta I_{CC}$  | additional supply current | per input pin;<br>$V_I = V_{CC} - 2.1 \text{ V}$ ; other pins<br>at $V_{CC}$ or GND; $I_O = 0 \text{ A}$ ;<br>$V_{CC} = 4.5 \text{ V}$ to 5.5 V | -     | -   | 1.35 | -                | 1.5  | -                 | 1.5  | mA            |
| $C_I$            | input capacitance         |   | -     | 3   | 10   | -                | 10   | -                 | 10   | pF            |
| $C_O$            | output capacitance        |   | -     | 4   | -    | -                | -    | -                 | -    | pF            |

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

Voltages are referenced to GND (ground = 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  |      |
| <b>74AHC273</b>                         |                   |   |                   |                              |      |                  |      |                   |      |      |
| $t_{pd}$                                | propagation delay | CP to Qn; see <a href="#">Figure 7</a> <sup>[2]</sup> |                   |                              |      |                  |      |                   |      |      |
|   |                   | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$               |                   |                              |      |                  |      |                   |      |      |
|   |                   | $C_L = 15\text{ pF}$                                  | -                 | 6.0                          | 13.6 | 1.0              | 16.0 | 1.0               | 17.0 | ns   |
|   |                   | $C_L = 50\text{ pF}$                                  | -                 | 8.6                          | 17.1 | 1.0              | 19.5 | 1.0               | 21.5 | ns   |
|   |                   | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$               |                   |                              |      |                  |      |                   |      |      |
|   |                   | $C_L = 15\text{ pF}$                                  | -                 | 4.2                          | 9    | 1.0              | 10.5 | 1.0               | 11.5 | ns   |
|   |                   | $C_L = 50\text{ pF}$                                  | -                 | 6.0                          | 11.0 | 1.0              | 12.5 | 1.0               | 14.0 | ns   |
|   |                   | MR to Qn; see <a href="#">Figure 8</a> <sup>[3]</sup> |                   |                              |      |                  |      |                   |      |      |
|   |                   | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$               |                   |                              |      |                  |      |                   |      |      |
|   |                   | $C_L = 15\text{ pF}$                                  | -                 | 5.1                          | 13.6 | 1.0              | 16.0 | 1.0               | 17.0 | ns   |
|   |                   | $C_L = 50\text{ pF}$                                  | -                 | 7.3                          | 17.1 | 1.0              | 19.5 | 1.0               | 21.5 | ns   |
|   |                   | $f_{max}$   | maximum frequency | see <a href="#">Figure 7</a> |      |                  |      |                   |      |      |
| $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ |                   |   |                   |                              |      |                  |      |                   |      |      |
| $C_L = 15\text{ pF}$                    | 75                |   |                   | 120                          | -    | 65               | -    | 65                | -    | MHz  |
| $C_L = 50\text{ pF}$                    | 50                |   |                   | 75                           | -    | 45               | -    | 45                | -    | MHz  |
| $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ |                   |   |                   |                              |      |                  |      |                   |      |      |
| $C_L = 15\text{ pF}$                    | 120               |   |                   | 165                          | -    | 100              | -    | 100               | -    | MHz  |
| $t_W$                                   | pulse width       | CP HIGH or LOW; see <a href="#">Figure 7</a>          |                   |                              |      |                  |      |                   |      |      |
|   |                   | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$               | 5.0               | -                            | -    | 6.5              | -    | 6.5               | -    | ns   |
|   |                   | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$               | 5.0               | -                            | -    | 5.0              | -    | 5.0               | -    | ns   |
|   |                   | MR LOW; see <a href="#">Figure 8</a>                  |                   |                              |      |                  |      |                   |      |      |
|   |                   | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$               | 5.0               | -                            | -    | 6.0              | -    | 6.0               | -    | ns   |
|   |                   | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$               | 5.0               | -                            | -    | 5.0              | -    | 5.0               | -    | ns   |
| $t_{su}$                                | set-up time       | Dn to CP; see <a href="#">Figure 9</a>                |                   |                              |      |                  |      |                   |      |      |
|   |                   | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$               | 3.0               | -                            | -    | 3.0              | -    | 3.0               | -    | ns   |
|   |                   | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$               | 3.0               | -                            | -    | 3.0              | -    | 3.0               | -    | ns   |
| $t_h$                                   | hold time         | Dn to CP; see <a href="#">Figure 9</a>                |                   |                              |      |                  |      |                   |      |      |
|   |                   | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$               | 1.0               | -                            | -    | 1.0              | -    | 1.0               | -    | ns   |
|   |                   | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$               | 1.0               | -                            | -    | 1.0              | -    | 1.0               | -    | ns   |



**Table 7. Dynamic characteristics ...continued**Voltages are referenced to GND (ground = 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>rec</sub>                                  | recovery time                 | MR to CP; see <a href="#">Figure 8</a>   |       |                    |      |                  |      |                   |      |      |
|   |                               | V <sub>CC</sub> = 3.0 V to 3.6 V   | 2.5   | -                  | -    | 2.5              | -    | 2.5               | -    | ns   |
|   |                               | V <sub>CC</sub> = 4.5 V to 5.5 V   | 2.0   | -                  | -    | 2.0              | -    | 2.0               | -    | ns   |
| C <sub>PD</sub>                                   | power dissipation capacitance | f <sub>i</sub> = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> <sup>[4]</sup> | -     | 14                 | -    | -                | -    | -                 | -    | pF   |
| <b>74AHCT273; V<sub>CC</sub> = 4.5 V to 5.5 V</b> |                               |  |       |                    |      |                  |      |                   |      |      |
| t <sub>pd</sub>                                   | propagation delay             | CP to Qn; see <a href="#">Figure 7</a> <sup>[2]</sup>                          |       |                    |      |                  |      |                   |      |      |
|   |                               | C <sub>L</sub> = 15 pF   | -     | 4.0                | 7.5  | 1.0              | 8.8  | 1.0               | 9.5  | ns   |
|   |                               | C <sub>L</sub> = 50 pF   | -     | 5.8                | 9.2  | 1.0              | 10.5 | 1.0               | 11.5 | ns   |
|   |                               | MR to Qn; see <a href="#">Figure 8</a> <sup>[3]</sup>                          |       |                    |      |                  |      |                   |      |      |
|   |                               | C <sub>L</sub> = 15 pF   | -     | 3.9                | 10.0 | 1.0              | 11.6 | 1.0               | 12.5 | ns   |
|   |                               | C <sub>L</sub> = 50 pF   | -     | 5.6                | 11.0 | 1.0              | 12.6 | 1.0               | 14.0 | ns   |
| f <sub>max</sub>                                  | maximum frequency             | see <a href="#">Figure 7</a>   |       |                    |      |                  |      |                   |      |      |
|   |                               | C <sub>L</sub> = 15 pF   | 75    | 120                | -    | 65               | -    | 65                | -    | MHz  |
|   |                               | C <sub>L</sub> = 50 pF   | 50    | 75                 | -    | 45               | -    | 45                | -    | MHz  |
| t <sub>W</sub>                                    | pulse width                   | CP HIGH or LOW; see <a href="#">Figure 7</a>                                   | 5.0   | -                  | -    | 6.5              | -    | 6.5               | -    | ns   |
|   |                               | MR LOW; see <a href="#">Figure 8</a>   | 5.0   | -                  | -    | 6.0              | -    | 6.0               | -    | ns   |
| t <sub>su</sub>                                   | set-up time                   | Dn to CP; see <a href="#">Figure 9</a>   | 3.0   | -                  | -    | 3.0              | -    | 3.0               | -    | ns   |
| t <sub>h</sub>                                    | hold time                     | Dn to CP; see <a href="#">Figure 9</a>   | 1.0   | -                  | -    | 1.0              | -    | 1.0               | -    | ns   |
| t <sub>rec</sub>                                  | recovery time                 | MR to CP; see <a href="#">Figure 8</a>   | 2.5   | -                  | -    | 2.5              | -    | 2.5               | -    | ns   |
| C <sub>PD</sub>                                   | power dissipation capacitance | f <sub>i</sub> = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> <sup>[4]</sup> | -     | 18                 | -    | -                | -    | -                 | -    | 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>.

[3] t<sub>pd</sub> is the same as t<sub>PHL</sub> only.

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

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

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

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

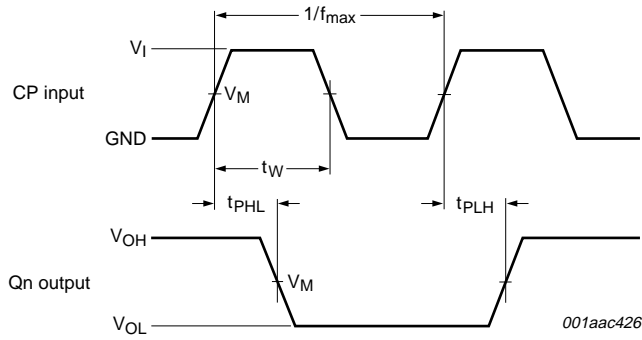
C<sub>L</sub> = output load capacitance in pF;

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

N = number of inputs switching;

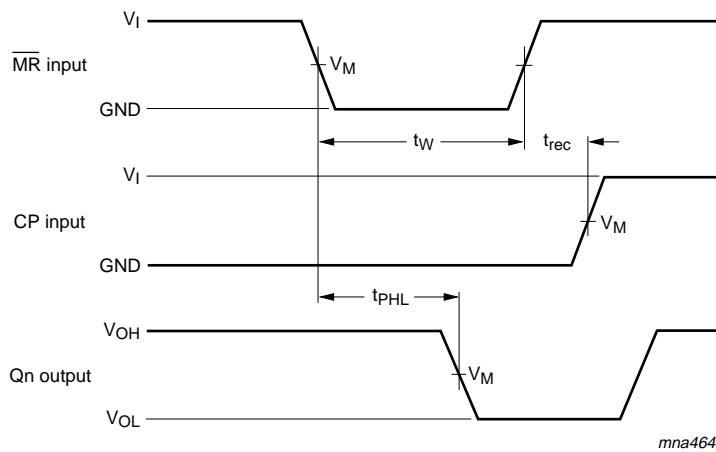
Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of the outputs.

11. Waveforms



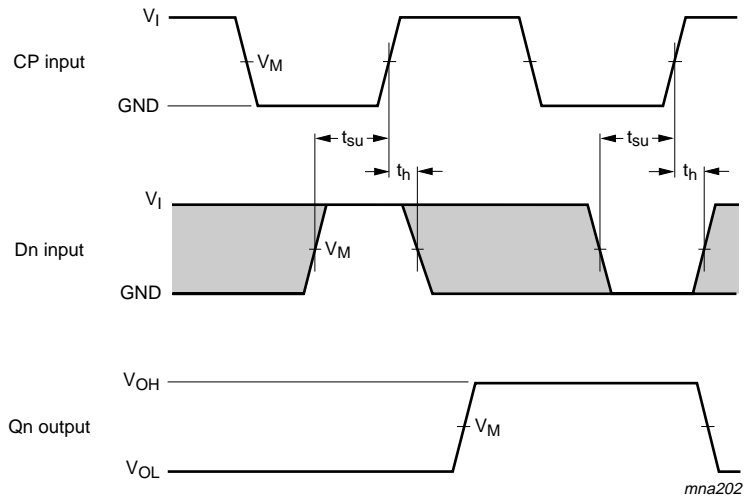
Measurement points are given in [Table 8](#).  
 $V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

**Fig 7. Clock pulse width, maximum frequency and input to output propagation delays**



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

**Fig 8. Master reset pulse width, recovery time and propagation delay**



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

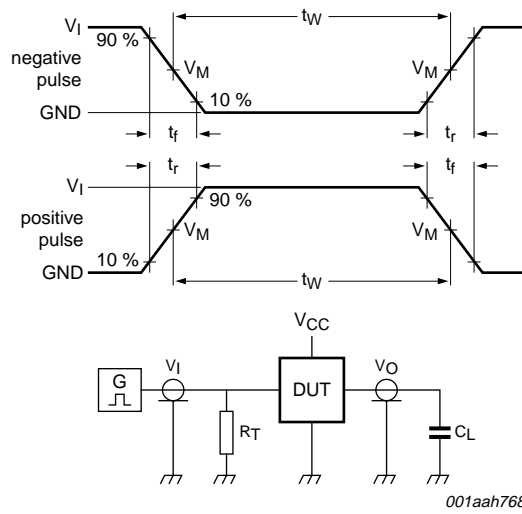
The shaded areas indicate when the input is permitted to change for predictable output performance.

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

**Fig 9. Data set-up and hold times**

**Table 8. Measurement points**

| Type      | Input               | Output              |
|-----------|---------------------|---------------------|
|           | $V_M$               | $V_M$               |
| 74AHC273  | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ |
| 74AHCT273 | 1.5 V               | $0.5 \times V_{CC}$ |



001aah768

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.

**Fig 10. Load circuitry for measuring switching times**

**Table 9. Test data**

| Type      | Input    |               | Load         | Test               |
|-----------|----------|---------------|--------------|--------------------|
|           | $V_I$    | $t_r, t_f$    | $C_L$        |                    |
| 74AHC273  | $V_{CC}$ | $\leq 3.0$ ns | 15 pF, 50 pF | $t_{PLH}, t_{PHL}$ |
| 74AHCT273 | 3.0 V    | $\leq 3.0$ ns | 15 pF, 50 pF | $t_{PLH}, t_{PHL}$ |

## 12. Package outline

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

SOT163-1

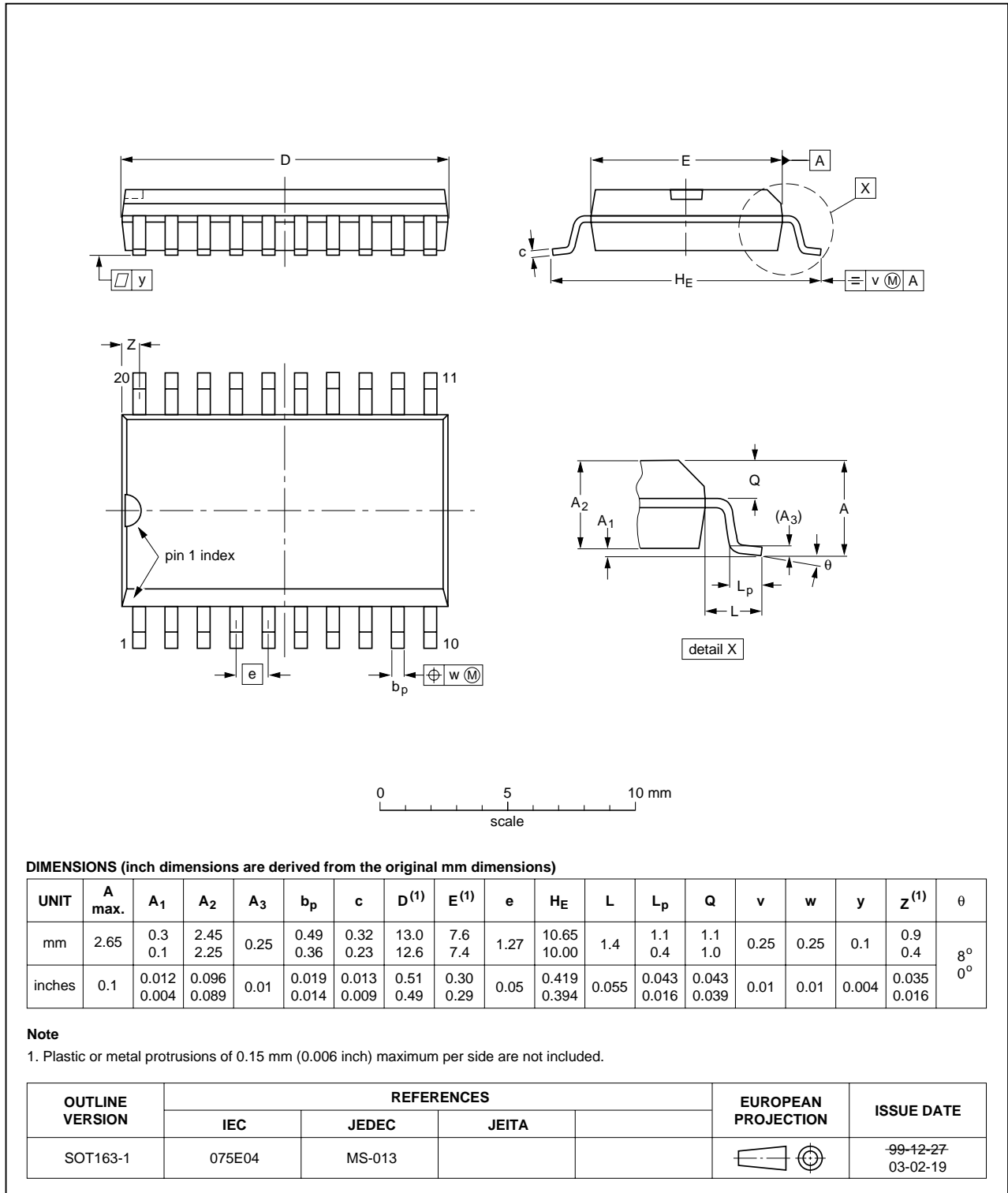


Fig 11. Package outline SOT163-1 (SO20)

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

SOT360-1

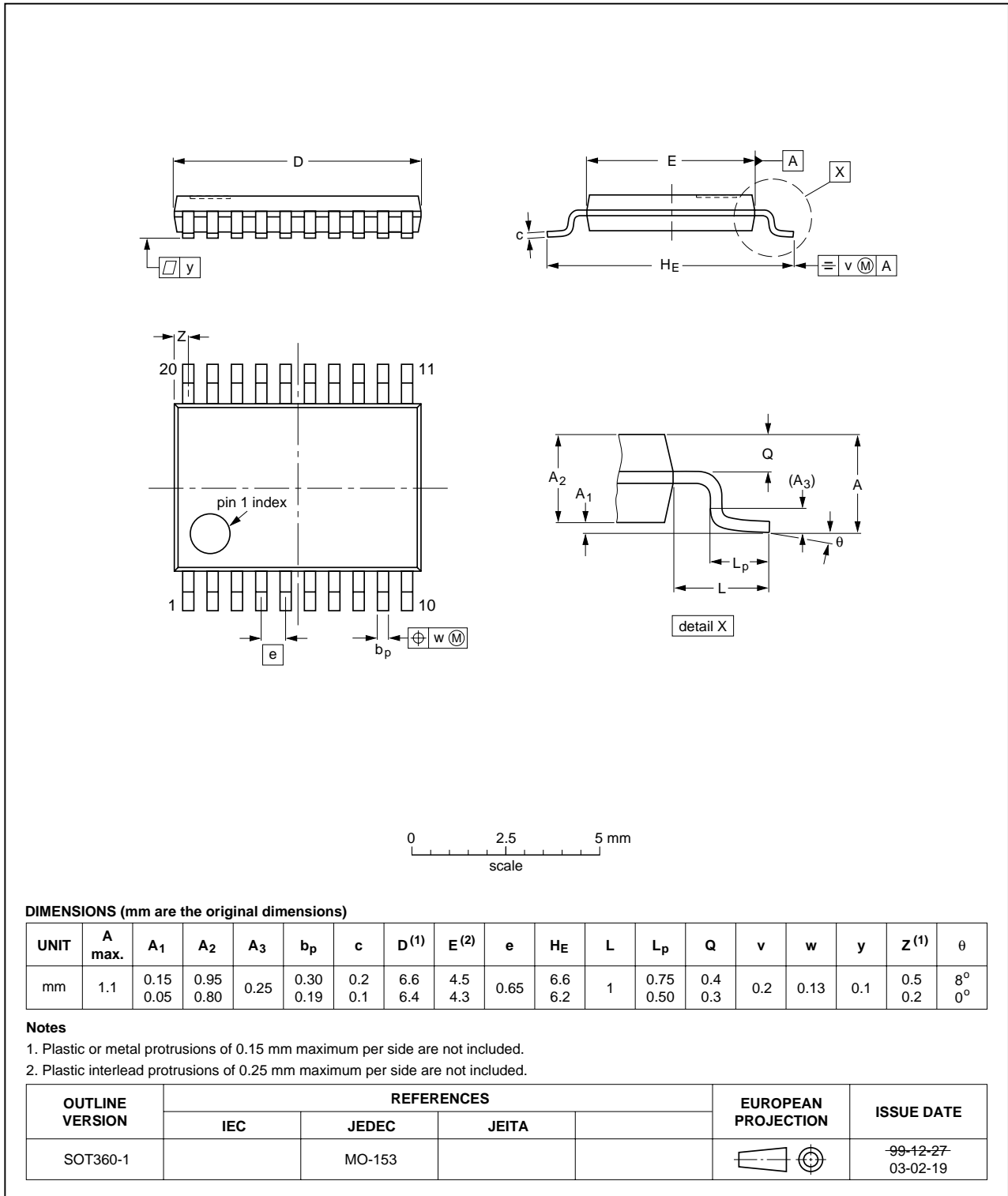


Fig 12. Package outline SOT360-1 (TSSOP20)

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

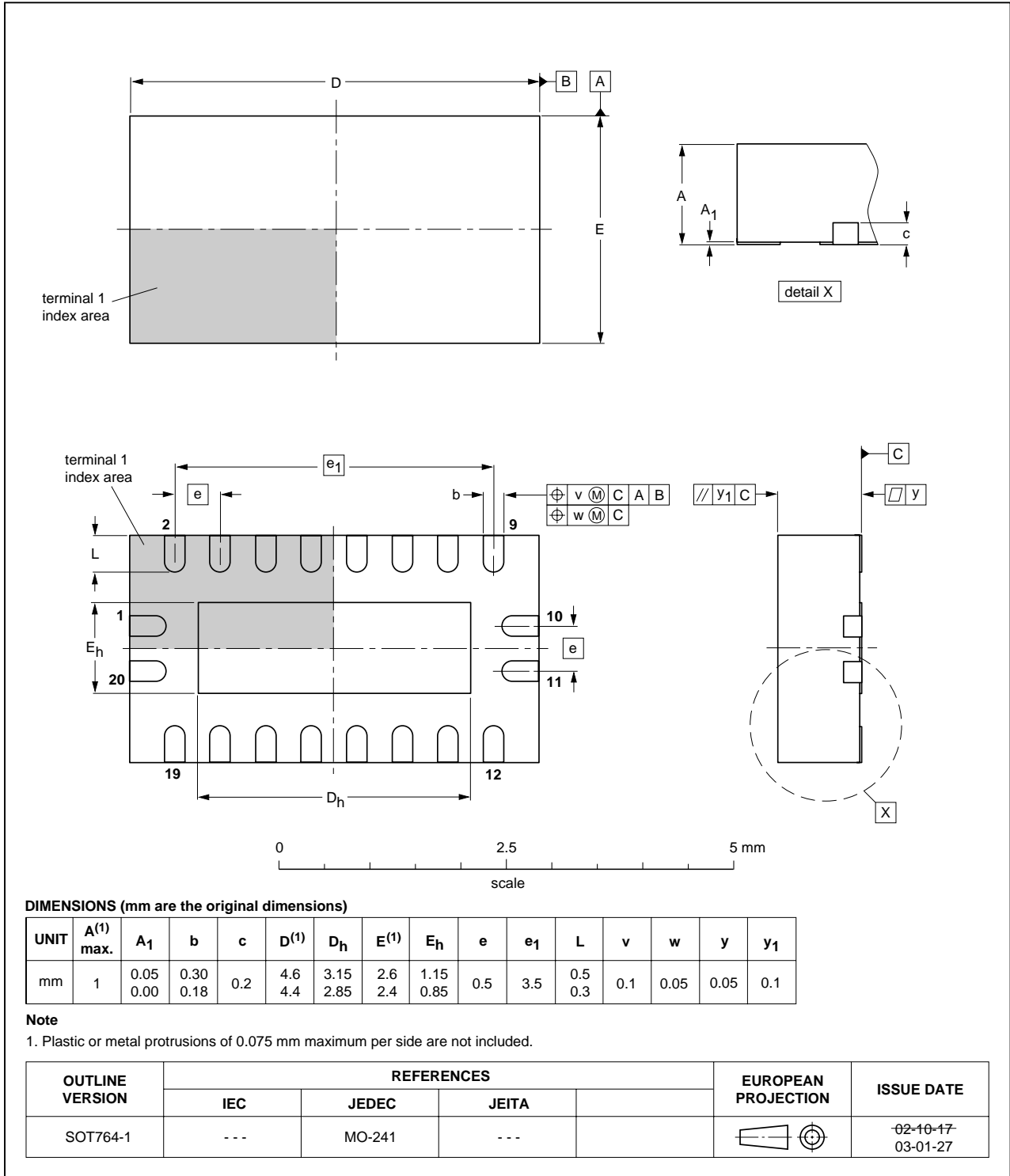


Fig 13. Package outline SOT764-1 (DHVQFN20)

## 13. Abbreviations

Table 10. Abbreviations

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

## 14. Revision history

Table 11. Revision history

| Document ID     | Release date  | Data sheet status     | Change notice | Supersedes      |
|-----------------|---|-----------------------|---------------|-----------------|
| 74AHC_AHCT273_3 | 20080513  | Product data sheet    | -             | 74AHC_AHCT273_2 |
| 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="#">Table 6</a>: the conditions for input leakage current have been changed.</li> </ul> |                       |               |                 |
| 74AHC_AHCT273_2 | 20030721  | Product specification | -             | 74AHC_AHCT273_1 |
| 74AHC_AHCT273_1 | 19990901  | 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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## 17. Contents

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