

# 74AHC241; 74AHCT241

Octal buffer/line driver; 3-state

Rev. 01 — 11 January 2010

Product data sheet

## 1. General description

The 74AHC241 and 74AHCT241 are 8-bit buffer/line drivers with 3-state outputs. These devices can be used as two 4-bit buffers or one 8-bit buffer. They feature two output enables ( $1\text{OE}$  and  $2\text{OE}$ ), each controlling four of the 3-state outputs. A HIGH on  $1\text{OE}$  or LOW on  $2\text{OE}$  causes the associated outputs to assume a high-impedance OFF-state. Inputs are over voltage tolerant. This feature allows the use of these devices as translators in mixed voltage environments.

## 2. Features

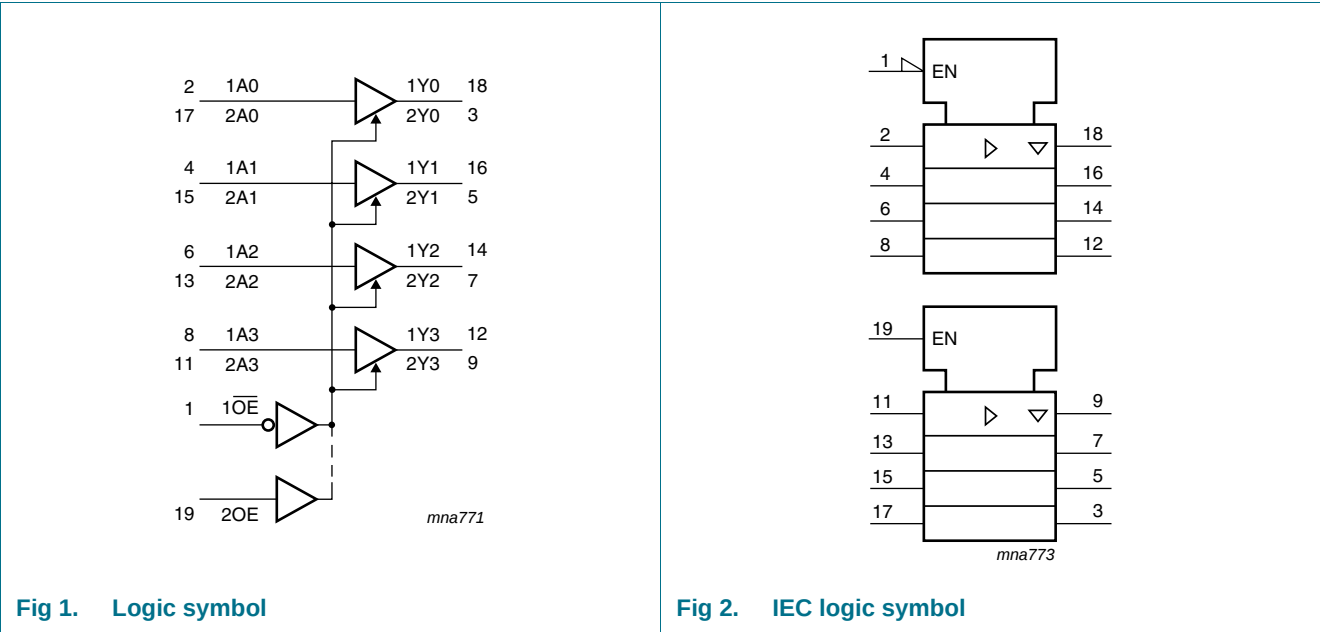
- Balanced propagation delays
- All inputs have a Schmitt-trigger action
- Inputs accepts voltages higher than  $V_{CC}$
- For 74AHC241 only: operates with CMOS input levels
- For 74AHCT241 only: operates with TTL input levels
- ESD protection:
  - ◆ HBM JESD22-A114F exceeds 2000 V
  - ◆ CDM JESD22-C101D 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

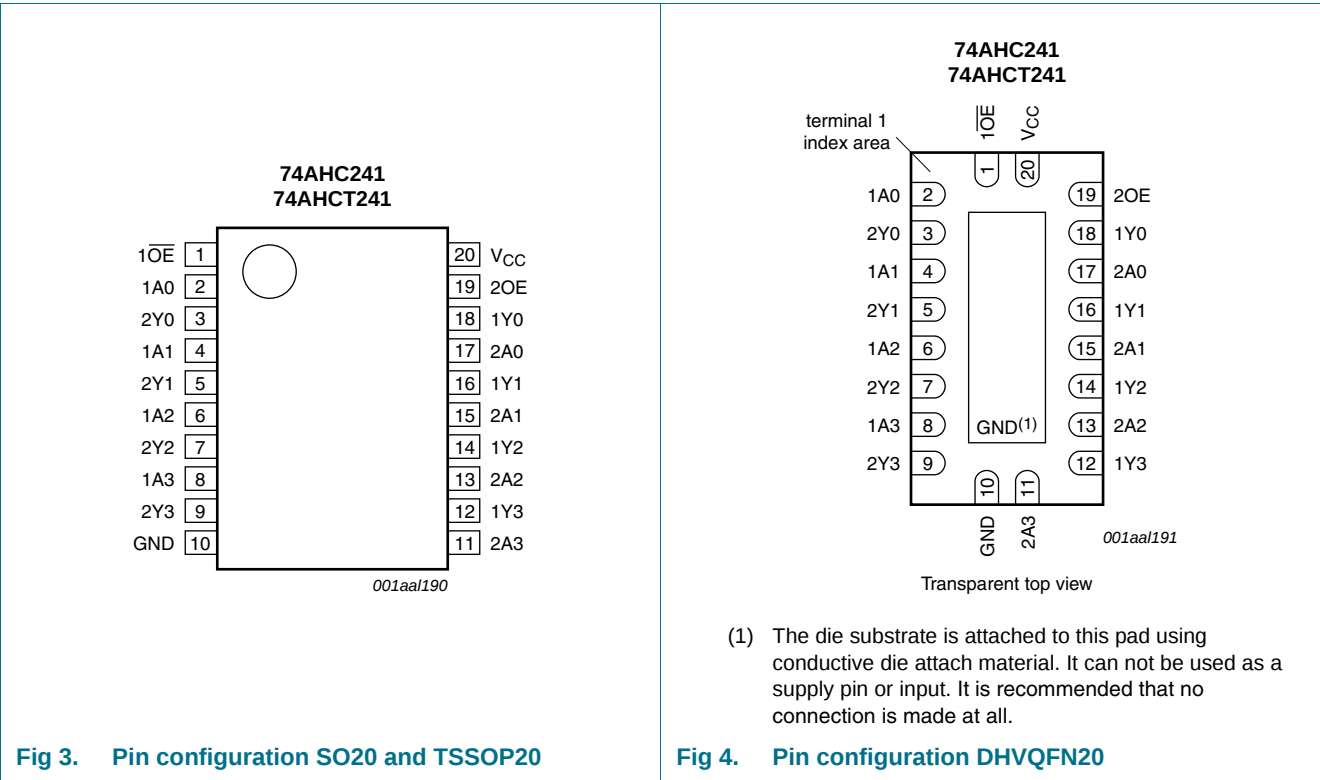
| Type number               | Package                                                         |          |                                                                                                                                                         |          |
|---------------------------|-----------------------------------------------------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|                           | Temperature range                                               | Name     | Description                                                                                                                                             | Version  |
| 74AHC241D<br>74AHCT241D   | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | SO20     | plastic small outline package; 20 leads;<br>body width 7.5 mm                                                                                           | SOT163-1 |
| 74AHC241PW<br>74AHCT241PW | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | TSSOP20  | plastic thin shrink small outline package; 20 leads;<br>body width 4.4 mm                                                                               | SOT360-1 |
| 74AHC241BQ<br>74AHCT241BQ | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | DHVQFN20 | plastic dual in-line compatible thermal enhanced<br>very thin quad flat package; no leads; 20 terminals;<br>body $2.5 \times 4.5 \times 0.85\text{ mm}$ | SOT764-1 |

4. Functional diagram



5. Pinning information

5.1 Pinning



## 5.2 Pin description

Table 2. Pin description

| Symbol             | Pin            | Description                       |
|--------------------|----------------|-----------------------------------|
| $\overline{1OE}$   | 1              | output enable input (active LOW)  |
| 2OE                | 19             | output enable input (active HIGH) |
| 1A0, 1A1, 1A2, 1A3 | 2, 4, 6, 8     | data input                        |
| 2A0, 2A1, 2A2, 2A3 | 17, 15, 13, 11 | data input                        |
| 1Y0, 1Y1, 1Y2, 1Y3 | 18, 16, 14, 12 | data output                       |
| 2Y0, 2Y1, 2Y2, 2Y3 | 3, 5, 7, 9     | data output                       |
| GND                | 10             | ground (0 V)                      |
| V <sub>CC</sub>    | 20             | power supply                      |

## 6. Functional description

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

| Input            |     | Output | Input |     | Output |
|------------------|-----|--------|-------|-----|--------|
| $\overline{1OE}$ | 1An | 1Yn    | 2OE   | 2An | 2Yn    |
| L                | L   | L      | H     | L   | L      |
| L                | H   | H      | H     | H   | H      |
| H                | X   | Z      | L     | X   | Z      |

[1] H = HIGH voltage level; L = LOW voltage level; X = don't care; Z = high-impedance OFF-state.

## 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  | mA   |
| I <sub>O</sub>   | output current          | V <sub>O</sub> = -0.5 V to (V <sub>CC</sub> + 0.5 V)                | -                  | ±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 minimum input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For SO20 package: above 70 °C the value of P<sub>tot</sub> derates linearly with 8.0 mW/K.  
 For TSSOP20 package: above 60 °C the value of P<sub>tot</sub> derates linearly with 5.5 mW/K.  
 For DHVQFN20 package: above 60 °C the value of P<sub>tot</sub> derates linearly with 4.5 mW/K.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

| Symbol           | Parameter                           | Conditions                      | Min | Typ | Max             | Unit |
|------------------|-------------------------------------|---------------------------------|-----|-----|-----------------|------|
| <b>74AHC241</b>  |                                     |                                 |     |     |                 |      |
| V <sub>CC</sub>  | supply voltage                      |                                 | 2.0 | 5.0 | 5.5             | V    |
| V <sub>I</sub>   | input voltage                       |                                 | 0   | -   | 5.5             | V    |
| V <sub>O</sub>   | output voltage                      |                                 | 0   | -   | V <sub>CC</sub> | V    |
| T <sub>amb</sub> | ambient temperature                 |                                 | -40 | +25 | +125            | °C   |
| Δt/ΔV            | input transition rise and fall rate | V <sub>CC</sub> = 3.3 V ± 0.3 V | -   | -   | 100             | ns/V |
|                  |                                     | V <sub>CC</sub> = 5 V ± 0.5 V   | -   | -   | 20              | ns/V |
| <b>74AHCT241</b> |                                     |                                 |     |     |                 |      |
| V <sub>CC</sub>  | supply voltage                      |                                 | 4.5 | 5.0 | 5.5             | V    |
| V <sub>I</sub>   | input voltage                       |                                 | 0   | -   | 5.5             | V    |
| V <sub>O</sub>   | output voltage                      |                                 | 0   | -   | V <sub>CC</sub> | V    |
| T <sub>amb</sub> | ambient temperature                 |                                 | -40 | +25 | +125            | °C   |
| Δt/ΔV            | input transition rise and fall rate | V <sub>CC</sub> = 5 V ± 0.5 V   | -   | -   | 20              | ns/V |

## 9. Static characteristics

**Table 6. Static characteristics**

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

| Symbol          | Parameter                 | Conditions                                          | 25 °C |     |      | −40 °C to +85 °C |      | −40 °C to +125 °C |      | Unit |
|-----------------|---------------------------|-----------------------------------------------------|-------|-----|------|------------------|------|-------------------|------|------|
|                 |                           |                                                     | Min   | Typ | Max  | Min              | Max  | Min               | Max  |      |
| 74AHC241        |                           |                                                     |       |     |      |                  |      |                   |      |      |
| V <sub>IH</sub> | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V                             | 1.5   | -   | -    | 1.5              | -    | 1.5               | -    | V    |
|                 |                           | V <sub>CC</sub> = 3.0 V                             | 2.1   | -   | -    | 2.1              | -    | 2.1               | -    | V    |
|                 |                           | V <sub>CC</sub> = 5.5 V                             | 3.85  | -   | -    | 3.85             | -    | 3.85              | -    | V    |
| V <sub>IL</sub> | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V                             | -     | -   | 0.5  | -                | 0.5  | -                 | 0.5  | V    |
|                 |                           | V <sub>CC</sub> = 3.0 V                             | -     | -   | 0.9  | -                | 0.9  | -                 | 0.9  | V    |
|                 |                           | V <sub>CC</sub> = 5.5 V                             | -     | -   | 1.65 | -                | 1.65 | -                 | 1.65 | V    |
| V <sub>OH</sub> | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> |       |     |      |                  |      |                   |      |      |
|                 |                           | I <sub>O</sub> = −50 μA; V <sub>CC</sub> = 2.0 V    | 1.9   | 2.0 | -    | 1.9              | -    | 1.9               | -    | V    |
|                 |                           | I <sub>O</sub> = −50 μA; V <sub>CC</sub> = 3.0 V    | 2.9   | 3.0 | -    | 2.9              | -    | 2.9               | -    | V    |
|                 |                           | I <sub>O</sub> = −50 μA; V <sub>CC</sub> = 4.5 V    | 4.4   | 4.5 | -    | 4.4              | -    | 4.4               | -    | V    |
|                 |                           | I <sub>O</sub> = −4.0 mA; V <sub>CC</sub> = 3.0 V   | 2.58  | -   | -    | 2.48             | -    | 2.40              | -    | V    |
|                 |                           | I <sub>O</sub> = −8.0 mA; V <sub>CC</sub> = 4.5 V   | 3.94  | -   | -    | 3.80             | -    | 3.70              | -    | V    |
| V <sub>OL</sub> | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> |       |     |      |                  |      |                   |      |      |
|                 |                           | I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 2.0 V     | -     | 0   | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                 |                           | I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 3.0 V     | -     | 0   | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                 |                           | I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 4.5 V     | -     | 0   | 0.1  | -                | 0.1  | -                 | 0.1  | V    |
|                 |                           | I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V    | -     | -   | 0.36 | -                | 0.44 | -                 | 0.55 | V    |
|                 |                           | I <sub>O</sub> = 8.0 mA; V <sub>CC</sub> = 4.5 V    | -     | -   | 0.36 | -                | 0.44 | -                 | 0.55 | V    |

**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        | $\mu\text{A}$ |
| $I_{OZ}$         | OFF-state output current  | $V_I = V_{IH}$ or $V_{IL}$ ;<br>$V_O = V_{CC}$ or GND;<br>$V_{CC} = 5.5 \text{ V}$                                                                      | -     | -   | $\pm 0.25$ | -                | $\pm 2.5$ | -                 | $\pm 10.0$ | $\mu\text{A}$ |
| $I_{CC}$         | 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         | $V_I = V_{CC}$ or GND                                                                                                                                   | -     | 3   | 10         | -                | 10        | -                 | 10         | pF            |
| $C_O$            | output capacitance        |                                                                                                                                                         | -     | 4   | -          | -                | -         | -                 | -          | pF            |
| <b>74AHCT241</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   | 4.5 | -          | 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        | $\mu\text{A}$ |
| $I_{OZ}$         | OFF-state output current  | $V_I = V_{IH}$ or $V_{IL}$ ;<br>$V_O = V_{CC}$ or GND per input pin; other inputs at $V_{CC}$ or GND; $I_O = 0 \text{ A}$ ;<br>$V_{CC} = 5.5 \text{ V}$ | -     | -   | $\pm 0.25$ | -                | $\pm 2.5$ | -                 | $\pm 10.0$ | $\mu\text{A}$ |
| $I_{CC}$         | 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>$V_I = V_{CC} - 2.1 \text{ V}$ ;<br>other pins at $V_{CC}$ or GND;<br>$I_O = 0 \text{ A}$ ; $V_{CC} = 4.5 \text{ V}$ to 5.5 V         | -     | -   | 1.35       | -                | 1.5       | -                 | 1.5        | mA            |
| $C_I$            | input capacitance         | $V_I = V_{CC}$ or GND                                                                                                                                   | -     | 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 8](#).

| Symbol           | Parameter                     | Conditions                                                                                              | 25 °C |                    |      | −40 °C to +125 °C |                |                 | Unit |
|------------------|-------------------------------|---------------------------------------------------------------------------------------------------------|-------|--------------------|------|-------------------|----------------|-----------------|------|
|                  |                               |                                                                                                         | Min   | Typ <sup>[1]</sup> | Max  | Min               | Max<br>(85 °C) | Max<br>(125 °C) |      |
| 74AHC241         |                               |                                                                                                         |       |                    |      |                   |                |                 |      |
| t <sub>pd</sub>  | propagation delay             | nAn to nYn; see <a href="#">Figure 5</a> <sup>[2]</sup>                                                 |       |                    |      |                   |                |                 |      |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V; C <sub>L</sub> = 15 pF                                                | -     | 4.5                | 8.4  | 1.0               | 9.7            | 11.5            | ns   |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V; C <sub>L</sub> = 50 pF                                                | -     | 6.5                | 12.2 | 1.0               | 14.5           | 16.9            | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 15 pF                                                | -     | 3.2                | 5.4  | 1.0               | 6.2            | 7.8             | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 50 pF                                                | -     | 3.2                | 7.9  | 1.0               | 9.2            | 11.2            | ns   |
| t <sub>en</sub>  | enable time                   | 1OE to 1Yn; see <a href="#">Figure 6</a> <sup>[2]</sup>                                                 |       |                    |      |                   |                |                 |      |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V; C <sub>L</sub> = 15 pF                                                | -     | 8.9                | 10.4 | 1.0               | 12.2           | 14.0            | ns   |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V; C <sub>L</sub> = 50 pF                                                | -     | 5.5                | 14.8 | 1.0               | 17.8           | 19.6            | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 15 pF                                                | -     | 6.1                | 6.6  | 1.0               | 7.6            | 9.1             | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 50 pF                                                | -     | 3.9                | 9.4  | 1.0               | 11.0           | 12.2            | ns   |
|                  |                               | 2OE to 2Yn; 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                | 10.4 | 1.0               | 12.2           | 14.0            | ns   |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V; C <sub>L</sub> = 50 pF                                                | -     | 5.6                | 14.8 | 1.0               | 17.8           | 19.6            | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 15 pF                                                | -     | 3.2                | 6.6  | 1.0               | 7.6            | 9.1             | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 50 pF                                                | -     | 4.0                | 9.4  | 1.0               | 11.0           | 12.2            | ns   |
| t <sub>dis</sub> | disable time                  | 1OE to 1Yn; see <a href="#">Figure 6</a> <sup>[2]</sup>                                                 |       |                    |      |                   |                |                 |      |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V; C <sub>L</sub> = 15 pF                                                | -     | 5.1                | 10.2 | 1.0               | 11.8           | 13.3            | ns   |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V; C <sub>L</sub> = 50 pF                                                | -     | 7.2                | 14.4 | 1.0               | 15.8           | 19.2            | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 15 pF                                                | -     | 3.6                | 7.3  | 1.0               | 8.2            | 9.2             | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 50 pF                                                | -     | 5.1                | 9.9  | 1.0               | 10.8           | 13.0            | ns   |
|                  |                               | 2OE to 2Yn; 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                                                | -     | 5.0                | 10.2 | 1.0               | 11.8           | 13.3            | ns   |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V; C <sub>L</sub> = 50 pF                                                | -     | 7.1                | 14.4 | 1.0               | 15.8           | 19.2            | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 15 pF                                                | -     | 3.6                | 7.3  | 1.0               | 8.2            | 9.2             | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 50 pF                                                | -     | 5.1                | 9.9  | 1.0               | 10.8           | 13.0            | ns   |
| C <sub>PD</sub>  | power dissipation capacitance | V <sub>I</sub> = GND to V <sub>CC</sub> ; C <sub>L</sub> = 50 pF; f <sub>i</sub> = 1 MHz <sup>[3]</sup> | -     | 9                  | -    | -                 | -              | -               | pF   |
| 74AHCT241        |                               |                                                                                                         |       |                    |      |                   |                |                 |      |
| t <sub>pd</sub>  | propagation delay             | nAn to nYn; see <a href="#">Figure 5</a> <sup>[2]</sup>                                                 |       |                    |      |                   |                |                 |      |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 15 pF                                                | -     | 3.5                | 5.7  | 1.0               | 6.5            | 7.9             | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 50 pF                                                | -     | 5.1                | 7.9  | 1.0               | 9.2            | 11.2            | ns   |

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

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 8](#).

| Symbol    | Parameter                     | Conditions                                                                             | 25 °C |                    |      | –40 °C to +125 °C |             |              | Unit |
|-----------|-------------------------------|----------------------------------------------------------------------------------------|-------|--------------------|------|-------------------|-------------|--------------|------|
|           |                               |                                                                                        | Min   | Typ <sup>[1]</sup> | Max  | Min               | Max (85 °C) | Max (125 °C) |      |
| $t_{en}$  | enable time                   | 1OE to 1Yn; see <a href="#">Figure 6</a> <sup>[2]</sup>                                |       |                    |      |                   |             |              |      |
|           |                               | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$                        | -     | 3.7                | 6.6  | 1.0               | 7.8         | 9.2          | ns   |
|           |                               | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$                        | -     | 5.4                | 9.5  | 1.0               | 11.1        | 12.4         | ns   |
|           |                               | 2OE to 2Yn; see <a href="#">Figure 7</a> <sup>[2]</sup>                                |       |                    |      |                   |             |              |      |
|           |                               | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$                        | -     | 3.7                | 6.6  | 1.0               | 7.8         | 9.2          | ns   |
|           |                               | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$                        | -     | 5.4                | 9.5  | 1.0               | 11.1        | 12.4         | ns   |
| $t_{dis}$ | disable time                  | 1OE to 1Yn; see <a href="#">Figure 6</a> <sup>[2]</sup>                                |       |                    |      |                   |             |              |      |
|           |                               | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$                        | -     | 4.8                | 7.8  | 1.0               | 8.8         | 9.7          | ns   |
|           |                               | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$                        | -     | 7.1                | 10.5 | 1.0               | 11.4        | 13.5         | ns   |
|           |                               | 2OE to 2Yn; see <a href="#">Figure 7</a> <sup>[2]</sup>                                |       |                    |      |                   |             |              |      |
|           |                               | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$                        | -     | 4.8                | 7.8  | 1.0               | 8.8         | 9.7          | ns   |
|           |                               | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$                        | -     | 7.1                | 10.5 | 1.0               | 11.4        | 13.5         | ns   |
| $C_{PD}$  | power dissipation capacitance | $V_I = \text{GND to } V_{CC}; C_L = 50 \text{ pF}; f_i = 1 \text{ MHz}$ <sup>[3]</sup> | -     | 9                  | -    | -                 | -           | -            | pF   |

[1] Typical values are measured at nominal supply voltage ( $V_{CC} = 3.3 \text{ V}$  and  $V_{CC} = 5.0 \text{ V}$ ).

[2]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ ;  $t_{en}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ ;  $t_{dis}$  is the same as  $t_{PLZ}$  and  $t_{PHZ}$ .

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

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

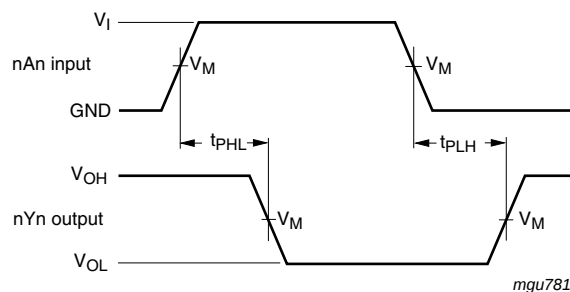
$C_L$  = output load capacitance in pF;

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

$N$  = number of inputs switching;

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

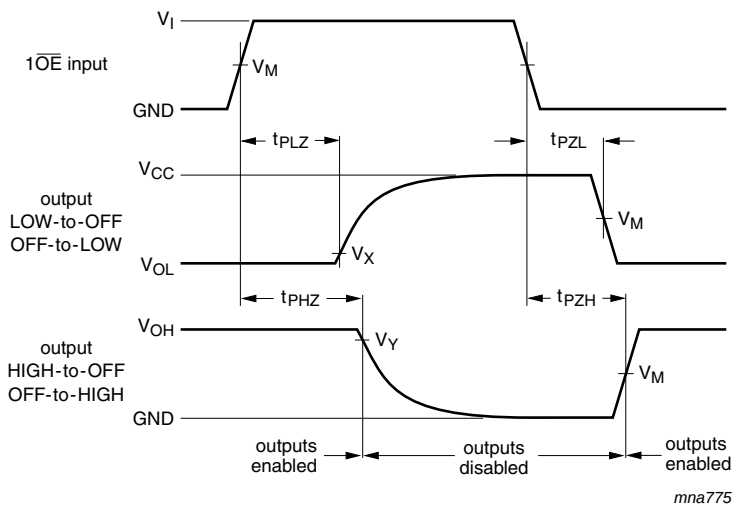
## 11. Waveforms



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

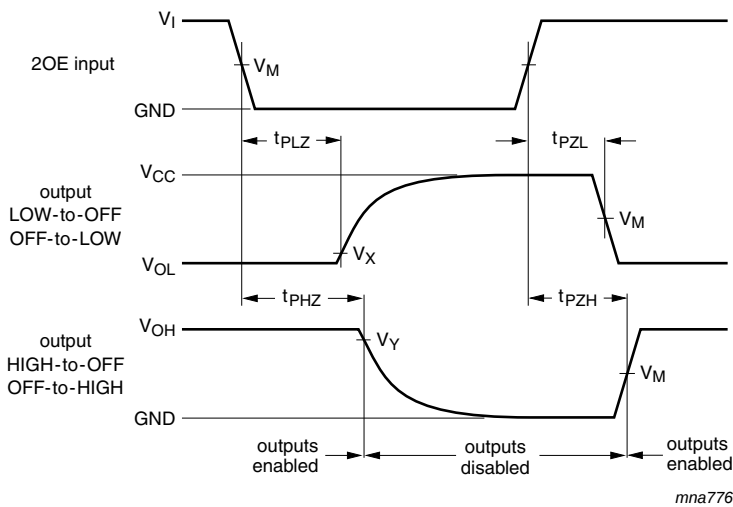
$V_{OL}$  and  $V_{OH}$  are typical voltage output drop that occur with the output load.

**Fig 5. Propagation delay input (nAn) to output (nYn)**



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

Fig 6. Enable and disable times for input 1OE

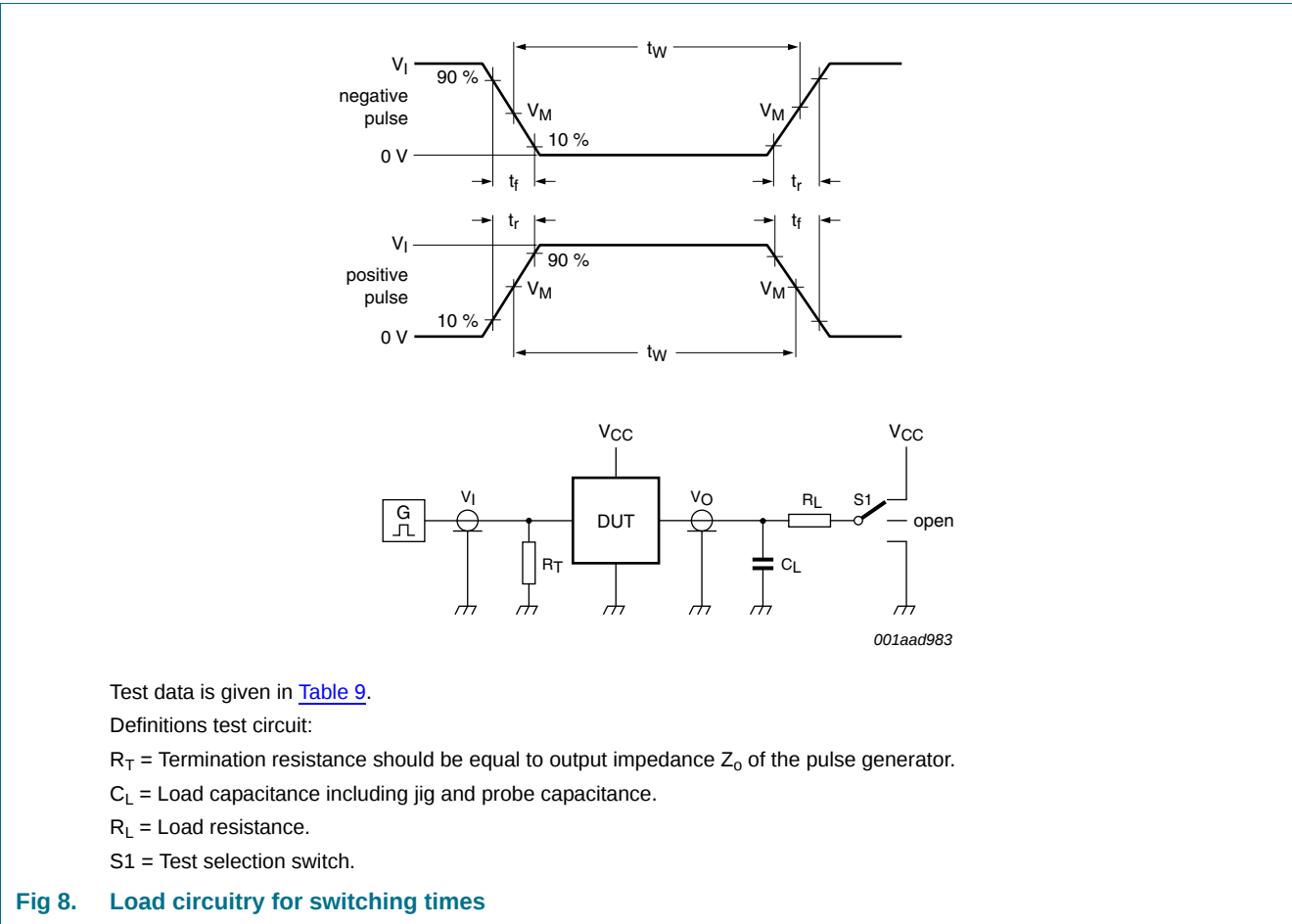


Measurement points are given in [Table 8](#).  
 $V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

Fig 7. Enable and disable times for input 2OE

Table 8. Measurement points

| Type      | Input       | Output      |                         |                         |
|-----------|-------------|-------------|-------------------------|-------------------------|
|           | $V_M$       | $V_M$       | $V_X$                   | $V_Y$                   |
| 74AHC241  | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL} + 0.3\text{ V}$ | $V_{OH} - 0.3\text{ V}$ |
| 74AHCT241 | 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 8. Load circuitry for switching times**

**Table 9. Test data**

| Type      | Input    |            | Load         |              | S1 position        |                    |                    |
|-----------|----------|------------|--------------|--------------|--------------------|--------------------|--------------------|
|           | $V_I$    | $t_r, t_f$ | $C_L$        | $R_L$        | $t_{PHL}, t_{PLH}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ |
| 74AHC241  | $V_{CC}$ | 3.0 ns     | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |
| 74AHCT241 | 3.0 V    | 3.0 ns     | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |

12. Package outline

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

SOT163-1

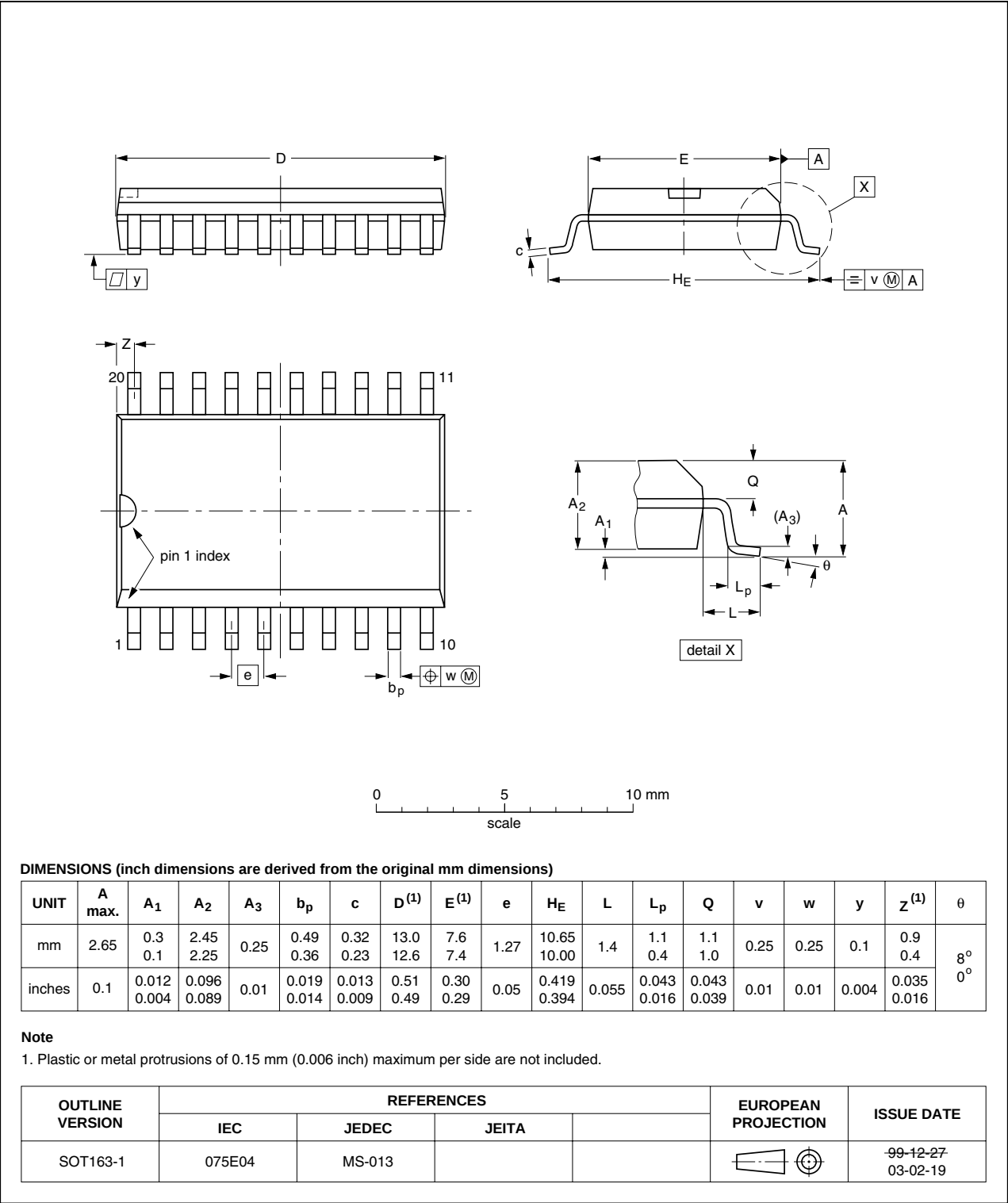


Fig 9. Package outline SOT163-1 (SO20)

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

SOT360-1

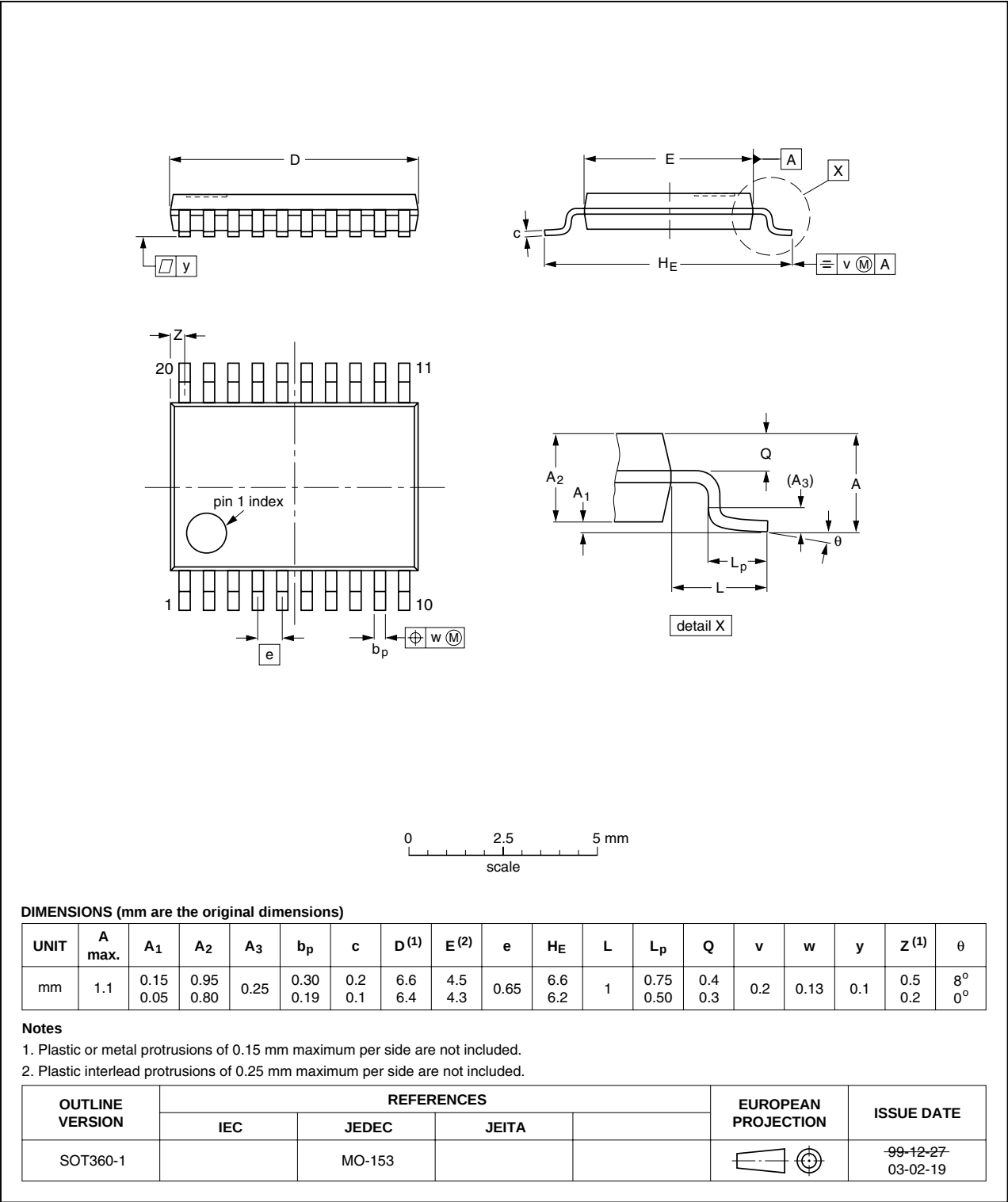


Fig 10. Package outline SOT360-1 (TSSOP20)

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

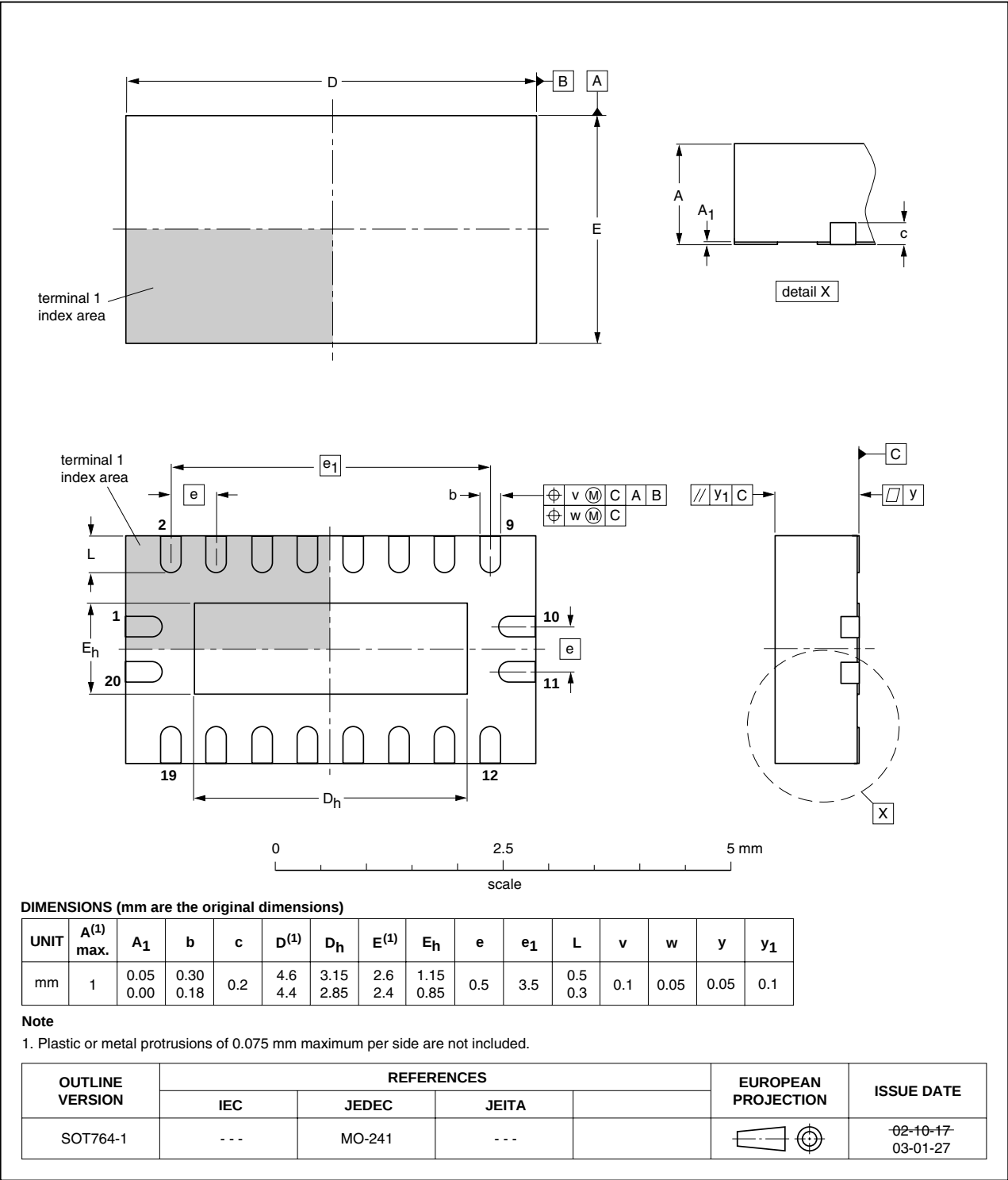


Fig 11. Package outline SOT764-1 (DHVQFN20)

## 13. Abbreviations

Table 10. Abbreviations

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

## 14. Revision history

Table 11. Revision history

| Document ID     | Release date | Data sheet status  | Change notice | Supersedes |
|-----------------|--------------|--------------------|---------------|------------|
| 74AHC_AHCT241_1 | 20100111     | Product data sheet | -             | -          |

## 15. Legal information

### 15.1 Data sheet status

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

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

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

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

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