

# 74VHC541-Q100; 74VHCT541-Q100

Octal buffer/line driver; 3-state

Rev. 2 — 3 September 2020

Product data sheet

## 1. General description

The 74VHC541-Q100; 74VHCT541-Q100 are high-speed Si-gate CMOS devices.

The 74VHC541-Q100; 74VHCT541-Q100 are octal non-inverting buffer/line drivers with 3-state bus compatible outputs.

The 3-state outputs are controlled by the output enable inputs  $\overline{OE}0$  and  $\overline{OE}1$ .

A HIGH on  $\overline{OE}n$  causes the outputs to assume a high-impedance OFF-state.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

## 2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Balanced propagation delays
- All inputs have a Schmitt-trigger action
- Inputs accepts voltages higher than  $V_{CC}$
- The 74VHC541-Q100 operates with CMOS input level
- The 74VHCT541-Q100 operates with TTL input level
- ESD protection:
  - MIL-STD-883, method 3015 exceeds 2000 V
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V (C = 200 pf, R = 0  $\Omega$ )
- Multiple package options
- DHVQFN package with Side-Wettable Flanks enabling Automatic Optical Inspection (AOI) of solder joints

## 3. Ordering information

Table 1. Ordering information

| Type number      | Package           |          |  | Version  |
|------------------|-------------------|----------|--|----------|
|                  | Temperature range | Name     | Description  |          |
| 74VHC541D-Q100   | -40 °C to +125 °C | SO20     | plastic small outline package; 20 leads; body width 7.5 mm   | SOT163-1 |
| 74VHCT541D-Q100  |                   |          |  |          |
| 74VHC541PW-Q100  | -40 °C to +125 °C | TSSOP20  | plastic thin shrink small outline package; 20 leads; body width 4.4 mm   | SOT360-1 |
| 74VHCT541PW-Q100 |                   |          |  |          |
| 74VHC541BQ-Q100  | -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 |
| 74VHCT541BQ-Q100 |                   |          |  |          |

### 4. Functional diagram

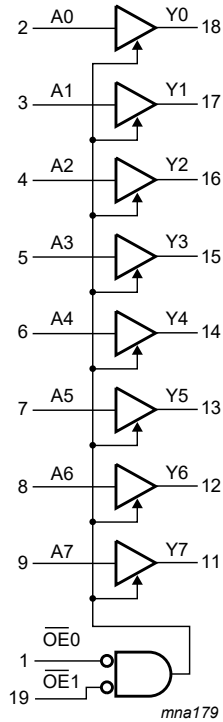


Fig. 1. Logic symbol

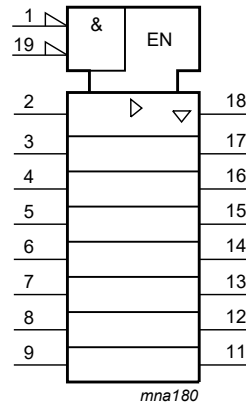
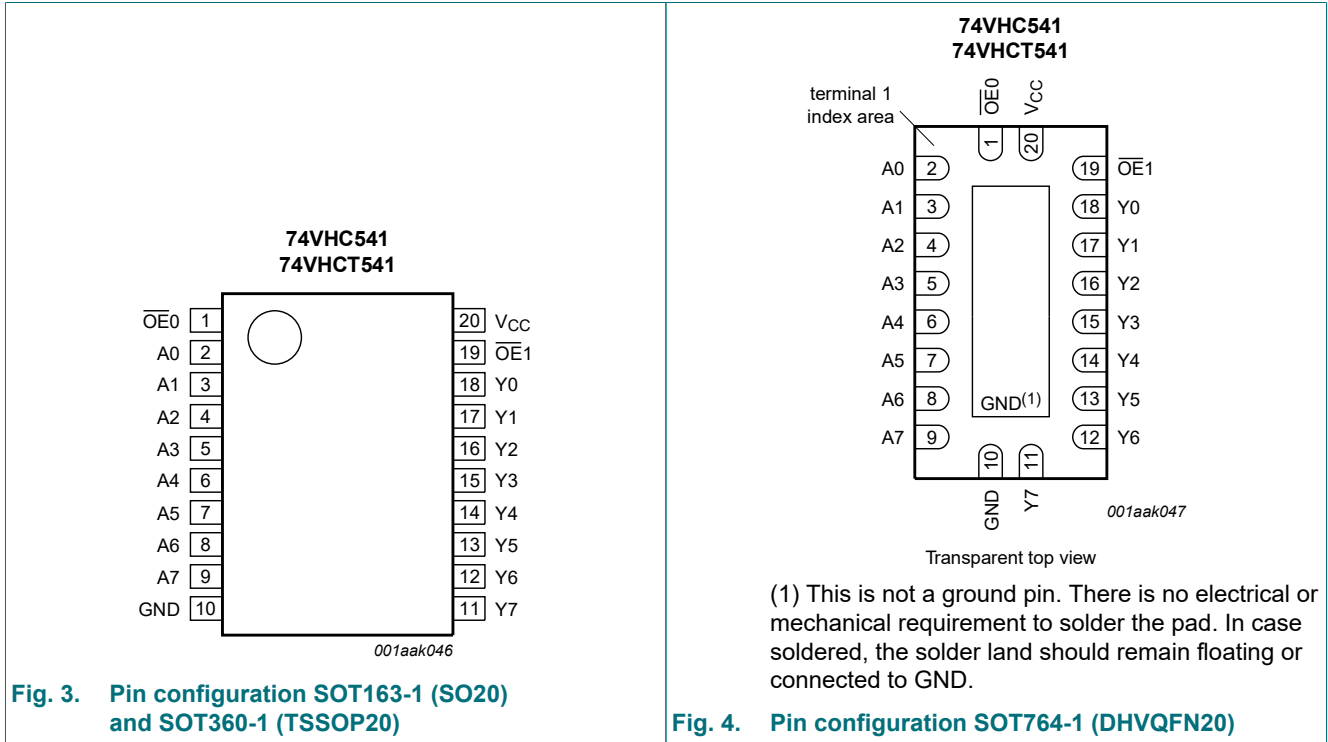


Fig. 2. IEC logic symbol

## 5. Pinning information

### 5.1. Pinning



### 5.2. Pin description

Table 2. Pin description

| Symbol                         | Pin                            | Description                      |
|--------------------------------|--------------------------------|----------------------------------|
| $\overline{OE}0$               | 1                              | output enable input (active LOW) |
| A0, A1, A2, A3, A4, A5, A6, A7 | 2, 3, 4, 5, 6, 7, 8, 9         | data input                       |
| GND                            | 10                             | ground (0 V)                     |
| Y0, Y1, Y2, Y3, Y4, Y5, Y6, Y7 | 18, 17, 16, 15, 14, 13, 12, 11 | data output                      |
| $\overline{OE}1$               | 19                             | output enable input (active LOW) |
| V <sub>CC</sub>                | 20                             | supply voltage                   |

## 6. Functional description

Table 3. Functional table

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

| Control          |                  | Input          | Output         |
|------------------|------------------|----------------|----------------|
| $\overline{OE}0$ | $\overline{OE}1$ | A <sub>n</sub> | Y <sub>n</sub> |
| L                | L                | L              | L              |
| L                | L                | H              | H              |
| X                | H                | X              | Z              |
| H                | X                | X              | Z              |

## 7. Limiting values

**Table 4. Limiting values**

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

| Symbol    | Parameter               | Conditions                                   | Min  | Max      | Unit |
|-----------|-------------------------|--|------|----------|------|
| $V_{CC}$  | supply voltage          |  | -0.5 | +7.0     | V    |
| $V_I$     | input voltage           |  | -0.5 | +7.0     | V    |
| $I_{IK}$  | input clamping current  | $V_I < -0.5$ V [1]                           | -20  | -        | mA   |
| $I_{OK}$  | output clamping current | $V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V [1] | -    | $\pm 20$ | mA   |
| $I_O$     | output current          | $V_O = -0.5$ V to $(V_{CC} + 0.5$ V)         | -    | $\pm 25$ | mA   |
| $I_{CC}$  | supply current          |  | -    | 75       | mA   |
| $I_{GND}$ | ground current          |  | -75  | -        | mA   |
| $T_{stg}$ | storage temperature     |  | -65  | +150     | °C   |
| $P_{tot}$ | total power dissipation | $T_{amb} = -40$ °C to +125 °C [2]            | -    | 500      | mW   |

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For SOT163-1 (SO20) package:  $P_{tot}$  derates linearly with 12.3 mW/K above 109 °C.

For SOT360-1 (TSSOP20) package:  $P_{tot}$  derates linearly with 10.0 mW/K above 100 °C.

For SOT764-1 (DHVQFN20) package:  $P_{tot}$  derates linearly with 12.9 mW/K above 111 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

Voltages are referenced to GND (ground = 0 V).

| Symbol              | Parameter                           | Conditions                   | 74VHC541-Q100 |     |          | 74VHCT541-Q100 |     |          | Unit |
|---------------------|-------------------------------------|------------------------------|---------------|-----|----------|----------------|-----|----------|------|
|                     |                                     |                              | Min           | Typ | Max      | Min            | Typ | Max      |      |
| $V_{CC}$            | supply voltage                      |                              | 2.0           | 5.0 | 5.5      | 4.5            | 5.0 | 5.5      | V    |
| $V_I$               | input voltage                       |                              | 0             | -   | 5.5      | 0              | -   | 5.5      | V    |
| $V_O$               | output voltage                      |                              | 0             | -   | $V_{CC}$ | 0              | -   | $V_{CC}$ | V    |
| $T_{amb}$           | ambient temperature                 |                              | -40           | +25 | +125     | -40            | +25 | +125     | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 3.3$ V $\pm$ 0.3 V | -             | -   | 100      | -              | -   | -        | ns/V |
|                     |                                     | $V_{CC} = 5.0$ V $\pm$ 0.5 V | -             | -   | 20       | -              | -   | 20       | ns/V |

## 9. Static characteristics

**Table 6. Static characteristics**

Voltages are referenced to GND (ground = 0 V).

| Symbol               | Parameter                 | Conditions   | 25 °C |     |       | -40 °C to +85 °C |      | -40 °C to +125 °C |       | Unit |
|----------------------|---------------------------|--|-------|-----|-------|------------------|------|-------------------|-------|------|
|                      |                           |  | Min   | Typ | Max   | Min              | Max  | Min               | Max   |      |
| <b>74VHC541-Q100</b> |                           |  |       |     |       |                  |      |                   |       |      |
| 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  | -   | -     | 3.8              | -    | 3.70              | -     | V    |
| V <sub>OL</sub>      | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>  |       |     |       |                  |      |                   |       |      |
|                      |                           | 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    |
| I <sub>OZ</sub>      | OFF-state output current  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;<br>V <sub>O</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 5.5 V | -     | -   | ±0.25 | -                | ±2.5 | -                 | ±10.0 | μA   |
| I <sub>I</sub>       | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 0 V to 5.5 V   | -     | -   | 0.1   | -                | 1.0  | -                 | 2.0   | μA   |
| I <sub>CC</sub>      | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A;<br>V <sub>CC</sub> = 5.5 V                                    | -     | -   | 4.0   | -                | 40   | -                 | 80    | μA   |
| C <sub>I</sub>       | input capacitance         |  | -     | 3.0 | 10    | -                | 10   | -                 | 10    | pF   |
| C <sub>O</sub>       | output capacitance        |  | -     | 4.0 | -     | -                | -    | -                 | -     | pF   |

| Symbol                | Parameter                 | Conditions   | 25 °C |     |       | -40 °C to +85 °C |      | -40 °C to +125 °C |       | Unit |
|-----------------------|---------------------------|--|-------|-----|-------|------------------|------|-------------------|-------|------|
|                       |                           |  | Min   | Typ | Max   | Min              | Max  | Min               | Max   |      |
| <b>74VHCT541-Q100</b> |                           |  |       |     |       |                  |      |                   |       |      |
| V <sub>IH</sub>       | HIGH-level input voltage  | V <sub>CC</sub> = 4.5 V to 5.5 V   | 2.0   | -   | -     | 2.0              | -    | 2.0               | -     | V    |
| V <sub>IL</sub>       | LOW-level input voltage   | V <sub>CC</sub> = 4.5 V to 5.5 V   | -     | -   | 0.8   | -                | 0.8  | -                 | 0.8   | V    |
| V <sub>OH</sub>       | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V  |       |     |       |                  |      |                   |       |      |
|                       |                           | I <sub>O</sub> = -50 µA  | 4.4   | 4.5 | -     | 4.4              | -    | 4.4               | -     | V    |
|                       |                           | I <sub>O</sub> = -8.0 mA   | 3.94  | -   | -     | 3.8              | -    | 3.70              | -     | V    |
| V <sub>OL</sub>       | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V  |       |     |       |                  |      |                   |       |      |
|                       |                           | I <sub>O</sub> = 50 µA   | -     | 0   | 0.1   | -                | 0.1  | -                 | 0.1   | V    |
|                       |                           | I <sub>O</sub> = 8.0 mA  | -     | -   | 0.36  | -                | 0.44 | -                 | 0.55  | V    |
| I <sub>OZ</sub>       | OFF-state output current  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;<br>V <sub>O</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 5.5 V                                   | -     | -   | ±0.25 | -                | ±2.5 | -                 | ±10.0 | µA   |
| I <sub>I</sub>        | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 0 V to 5.5 V   | -     | -   | 0.1   | -                | 1.0  | -                 | 2.0   | µA   |
| I <sub>CC</sub>       | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A;<br>V <sub>CC</sub> = 5.5 V  | -     | -   | 4.0   | -                | 40   | -                 | 80    | µA   |
| ΔI <sub>CC</sub>      | additional supply current | per input pin;<br>V <sub>I</sub> = V <sub>CC</sub> - 2.1 V; I <sub>O</sub> = 0 A;<br>other pins at V <sub>CC</sub> or GND;<br>V <sub>CC</sub> = 4.5 V to 5.5 V | -     | -   | 1.35  | -                | 1.5  | -                 | 1.5   | mA   |
| C <sub>I</sub>        | input capacitance         |  | -     | 3   | 10    | -                | 10   | -                 | 10    | pF   |
| C <sub>O</sub>        | output capacitance        |  | -     | 4.0 | -     | -                | -    | -                 | -     | pF   |

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

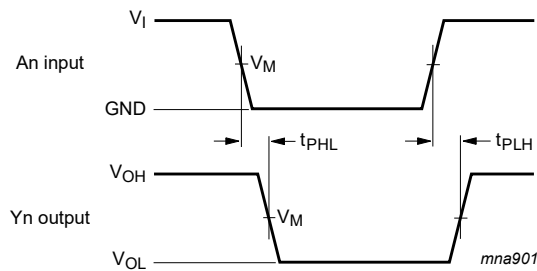
$GND = 0\text{ V}$ . For test circuit see Fig. 7.

| Symbol               | Parameter                     | Conditions   | 25 °C |        |      | -40 °C to +85 °C |      | -40 °C to +125 °C |      | Unit |
|----------------------|-------------------------------|--|-------|--------|------|------------------|------|-------------------|------|------|
|                      |                               |  | Min   | Typ[1] | Max  | Min              | Max  | Min               | Max  |      |
| <b>74VHC541-Q100</b> |                               |  |       |        |      |                  |      |                   |      |      |
| $t_{pd}$             | propagation delay             | An to Yn; see Fig. 5 [2]   |       |        |      |                  |      |                   |      |      |
|                      |                               | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$  |       |        |      |                  |      |                   |      |      |
|                      |                               | $C_L = 15\text{ pF}$   | -     | 5.0    | 7.0  | 1.0              | 8.5  | 1.0               | 9.0  | ns   |
|                      |                               | $C_L = 50\text{ pF}$   | -     | 7.0    | 10.5 | 1.0              | 12.0 | 1.0               | 13.5 | ns   |
|                      |                               | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$  |       |        |      |                  |      |                   |      |      |
|                      |                               | $C_L = 15\text{ pF}$   | -     | 3.5    | 5.0  | 1.0              | 6.0  | 1.0               | 6.5  | ns   |
|                      |                               | $C_L = 50\text{ pF}$   |       | 5.0    | 7.0  | 1.0              | 8.0  | 1.0               | 9.0  | ns   |
| $t_{en}$             | enable time                   | $\overline{O}E_n$ to Yn; see Fig. 6 [2]  |       |        |      |                  |      |                   |      |      |
|                      |                               | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$  |       |        |      |                  |      |                   |      |      |
|                      |                               | $C_L = 15\text{ pF}$   | -     | 5.5    | 10.5 | 1.0              | 11.0 | 1.0               | 13.5 | ns   |
|                      |                               | $C_L = 50\text{ pF}$   | -     | 7.5    | 14.0 | 1.0              | 16.0 | 1.0               | 17.5 | ns   |
|                      |                               | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$  |       |        |      |                  |      |                   |      |      |
|                      |                               | $C_L = 15\text{ pF}$   | -     | 3.5    | 7.2  | 1.0              | 8.5  | 1.0               | 9.0  | ns   |
|                      |                               | $C_L = 50\text{ pF}$   | -     | 5.0    | 9.2  | 1.0              | 10.5 | 1.0               | 11.5 | ns   |
| $t_{dis}$            | disable time                  | $\overline{O}E_n$ to Yn; see Fig. 6 [2]  |       |        |      |                  |      |                   |      |      |
|                      |                               | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$  |       |        |      |                  |      |                   |      |      |
|                      |                               | $C_L = 15\text{ pF}$   | -     | 6.0    | 11.0 | 1.0              | 12.0 | 1.0               | 14.0 | ns   |
|                      |                               | $C_L = 50\text{ pF}$   | -     | 9.5    | 15.4 | 1.0              | 17.5 | 1.0               | 19.5 | ns   |
|                      |                               | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$  |       |        |      |                  |      |                   |      |      |
|                      |                               | $C_L = 15\text{ pF}$   | -     | 4.5    | 7.5  | 1.0              | 8.0  | 1.0               | 9.5  | ns   |
|                      |                               | $C_L = 50\text{ pF}$   | -     | 6.5    | 8.8  | 1.0              | 10.0 | 1.0               | 11.0 | ns   |
| $C_{PD}$             | power dissipation capacitance | $C_L = 50\text{ pF}$ ; $f_i = 1\text{ MHz}$ ; $V_I = GND\text{ to }V_{CC}$ [3] | -     | 10     | -    | -                | -    | -                 | -    | pF   |

| Symbol                | Parameter                     | Conditions  | 25 °C |        |      | -40 °C to +85 °C |      | -40 °C to +125 °C |      | Unit |
|-----------------------|-------------------------------|---|-------|--------|------|------------------|------|-------------------|------|------|
|                       |                               |   | Min   | Typ[1] | Max  | Min              | Max  | Min               | Max  |      |
| <b>74VHCT541-Q100</b> |                               |   |       |        |      |                  |      |                   |      |      |
| t <sub>pd</sub>       | propagation delay             | An to Yn; see Fig. 5 [2]  |       |        |      |                  |      |                   |      |      |
|                       |                               | V <sub>CC</sub> = 4.5 V to 5.5 V  |       |        |      |                  |      |                   |      |      |
|                       |                               | C <sub>L</sub> = 15 pF  | -     | 3.5    | 5.5  | 1.0              | 6.5  | 1.0               | 7.0  | ns   |
|                       |                               | C <sub>L</sub> = 50 pF  | -     | 5.0    | 8.5  | 1.0              | 9.5  | 1.0               | 11.0 | ns   |
| t <sub>en</sub>       | enable time                   | $\overline{O}E_n$ to Yn; see Fig. 6   |       |        |      |                  |      |                   |      |      |
|                       |                               | V <sub>CC</sub> = 4.5 V to 5.5 V  |       |        |      |                  |      |                   |      |      |
|                       |                               | C <sub>L</sub> = 15 pF  | -     | 4.0    | 7.0  | 1.0              | 8.0  | 1.0               | 9.0  | ns   |
|                       |                               | C <sub>L</sub> = 50 pF  | -     | 5.5    | 10.0 | 1.0              | 12.0 | 1.0               | 12.5 | ns   |
| t <sub>dis</sub>      | disable time                  | $\overline{O}E_n$ to Yn; see Fig. 6 [2]   |       |        |      |                  |      |                   |      |      |
|                       |                               | V <sub>CC</sub> = 4.5 V to 5.5 V  |       |        |      |                  |      |                   |      |      |
|                       |                               | C <sub>L</sub> = 15 pF  | -     | 5.0    | 7.0  | 1.0              | 8.0  | 1.0               | 9.0  | ns   |
|                       |                               | C <sub>L</sub> = 50 pF  | -     | 7.0    | 10.0 | 1.0              | 12.0 | 1.0               | 12.5 | ns   |
| C <sub>PD</sub>       | power dissipation capacitance | C <sub>L</sub> = 50 pF; f <sub>i</sub> = 1 MHz; V <sub>i</sub> = GND to V <sub>CC</sub> [3] | -     | 12     | -    | -                | -    | -                 | -    | pF   |

- [1] Typical values are measured at nominal supply voltage (V<sub>CC</sub> = 3.3 V and V<sub>CC</sub> = 5.0 V).
- [2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.  
t<sub>en</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>.  
t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>.
- [3] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).  
P<sub>D</sub> = C<sub>PD</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>i</sub> × N + Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) 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  
Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of the outputs.

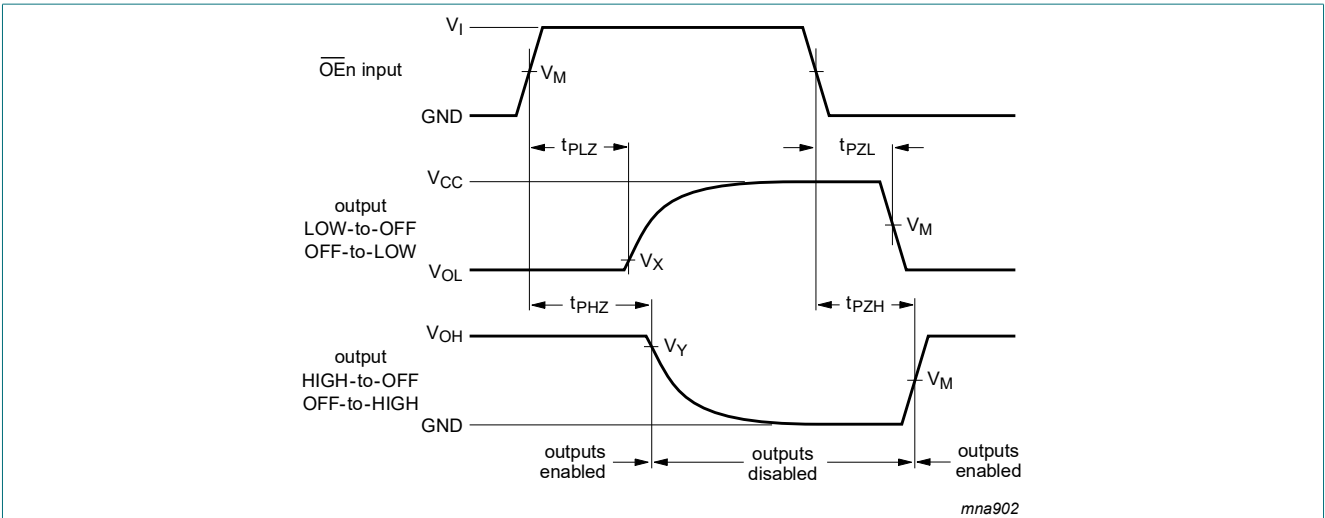
### 10.1. Waveforms and test circuit



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

**Fig. 5. Propagation delay input (An) to output (Yn)**





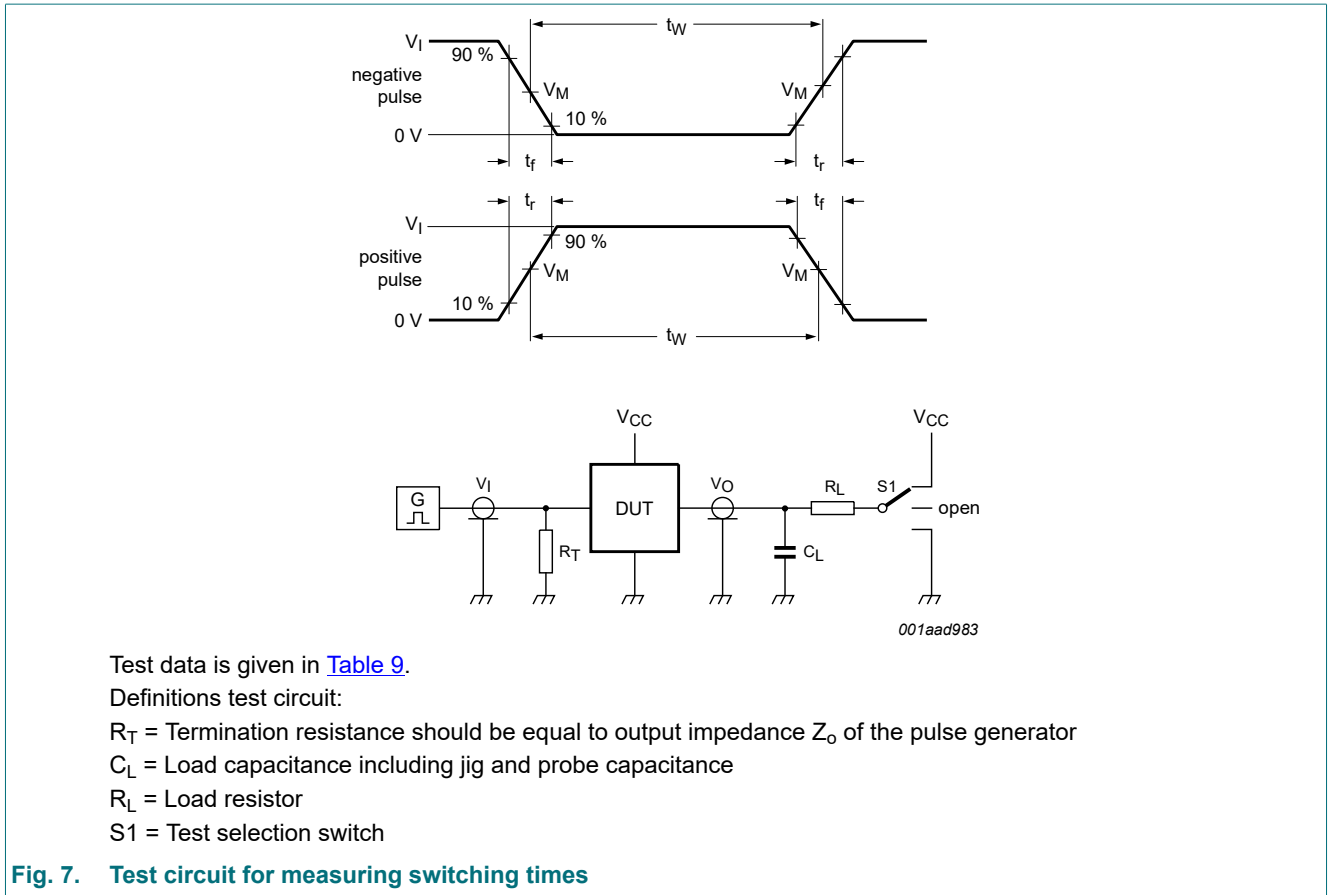
Measurement points are given in [Table 8](#).

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

**Fig. 6. Enable and disable times**

**Table 8. Measurement points**

| Type           | Input       | Output      |                  |                  |
|----------------|-------------|-------------|------------------|------------------|
|                | $V_M$       | $V_M$       | $V_X$            | $V_Y$            |
| 74VHC541-Q100  | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL} + 0.3 V$ | $V_{OH} - 0.3 V$ |
| 74VHCT541-Q100 | 1.5 V       | $0.5V_{CC}$ | $V_{OL} + 0.3 V$ | $V_{OH} - 0.3 V$ |



**Table 9. Test data**

| Type           | Input    |            | Load         |              | S1 position        |                    |                    |
|----------------|----------|------------|--------------|--------------|--------------------|--------------------|--------------------|
|                | $V_I$    | $t_r, t_f$ | $C_L$        | $R_L$        | $t_{PHL}, t_{PLH}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ |
| 74VHC541-Q100  | $V_{CC}$ | 3.0 ns     | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |
| 74VHCT541-Q100 | 3.0 V    | 3.0 ns     | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |

### 11. Package outline

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

SOT163-1

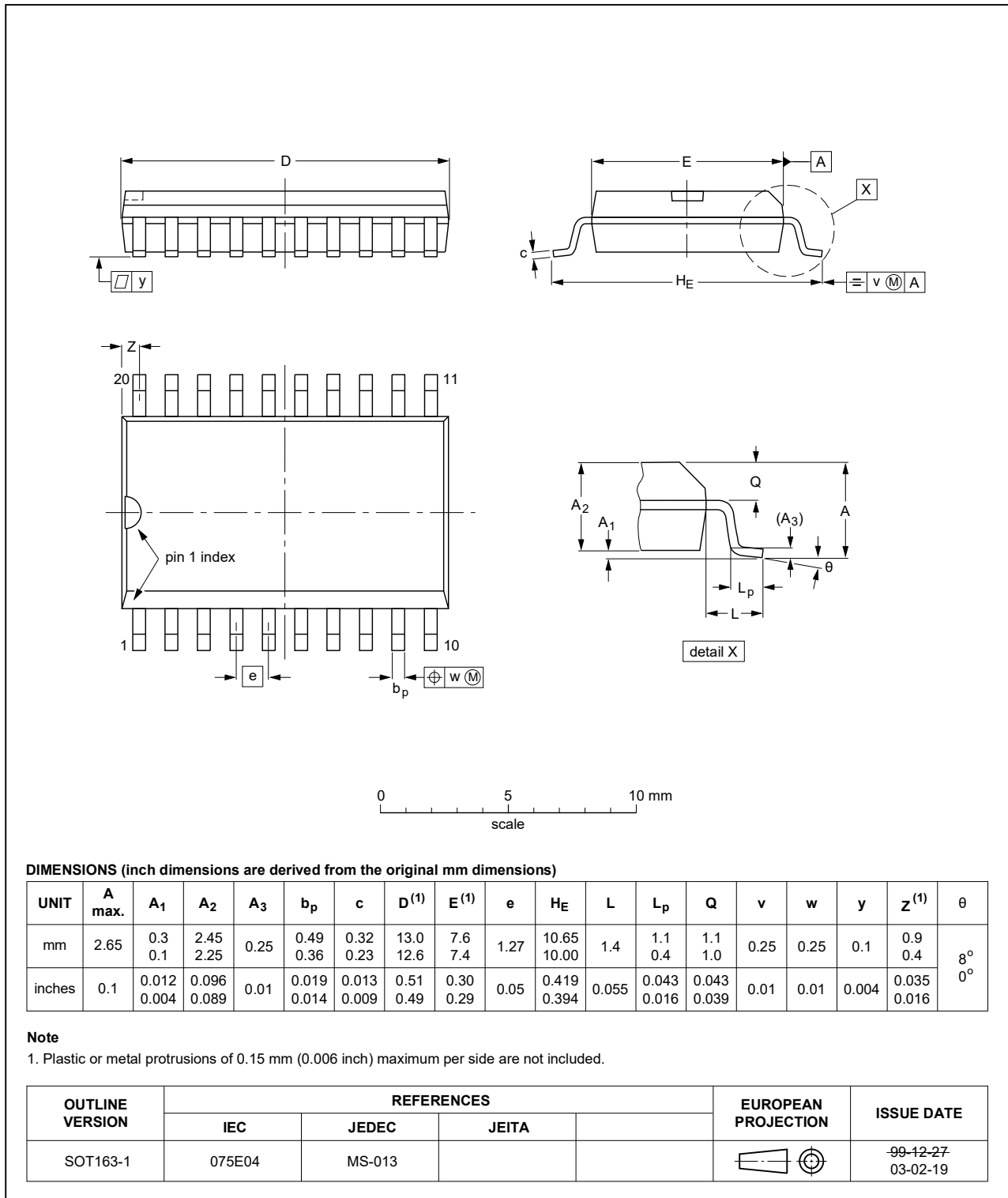


Fig. 8. Package outline SOT163-1 (SO20)

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

SOT360-1



Fig. 9. 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. 10. Package outline SOT764-1 (DHVQFN20)

## 12. Abbreviations

Table 10. Abbreviations

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

## 13. Revision history

Table 11. Revision history

| Document ID            | Release date   | Data sheet status  | Change notice | Supersedes             |
|------------------------|--|--------------------|---------------|------------------------|
| 74VHC_VHCT541_Q100 v.2 | 20200903   | Product data sheet | -             | 74VHC_VHCT541_Q100 v.1 |
| Modifications:         | <ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li><a href="#">Section 2</a> updated.</li> <li><a href="#">Table 4</a>: Derating values for <math>P_{tot}</math> total power dissipation have been updated.</li> <li><a href="#">Table 6</a>: Conditions for <math>I_{OZ}</math> corrected.</li> <li><a href="#">Fig. 10</a>: Package outline drawing SOT764-1 (DHVQFN20) updated.</li> </ul> |                    |               |                        |
| 74VHC_VHCT541_Q100 v.1 | 20130604   | Product data sheet | -             | -                      |

## 14. Legal information

### Data sheet status

| Document status [1][2]         | Product status [3] | 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 <https://www.nexperia.com>.

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