

# 74LVC4066-Q100

Quad bilateral switch

Rev. 2 — 26 March 2020

Product data sheet

## 1. General description

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The 74LVC4066-Q100 is a high-speed Si-gate CMOS device.

The 74LVC4066-Q100 provides four single pole, single-throw analog switch functions. Each switch has two input/output terminals (nY and nZ) and an active HIGH enable input (nE). When nE is LOW, the analog switch is turned off.

Schmitt-trigger action at the enable inputs makes the circuit tolerant of slower input rise and fall times across the entire  $V_{CC}$  range from 1.65 V to 5.5 V.

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

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- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Wide supply voltage range from 1.65 V to 5.5 V
- Very low ON resistance:
  - 7.5  $\Omega$  (typical) at  $V_{CC} = 2.7$  V
  - 6.5  $\Omega$  (typical) at  $V_{CC} = 3.3$  V
  - 6  $\Omega$  (typical) at  $V_{CC} = 5$  V
- Switch current capability of 32 mA
- High noise immunity
- CMOS low-power consumption
- Direct interface TTL-levels
- Latch-up performance exceeds 250 mA
- 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  $\Omega$ )
- Enable inputs accept voltages up to 5 V
- 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  |          |
| 74LVC4066D-Q100  | -40 °C to +125 °C | SO14     | plastic small outline package; 14 leads; body width 3.9 mm   | SOT108-1 |
| 74LVC4066PW-Q100 | -40 °C to +125 °C | TSSOP14  | plastic thin shrink small outline package; 14 leads; body width 4.4 mm   | SOT402-1 |
| 74LVC4066BQ-Q100 | -40 °C to +125 °C | DHVQFN14 | plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 × 3 × 0.85 mm | SOT762-1 |

### 4. Functional diagram

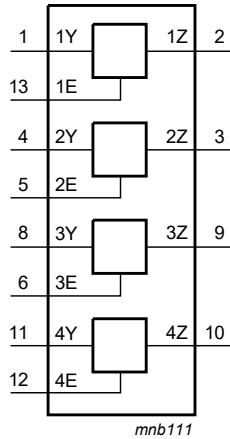


Fig. 1. Logic symbol

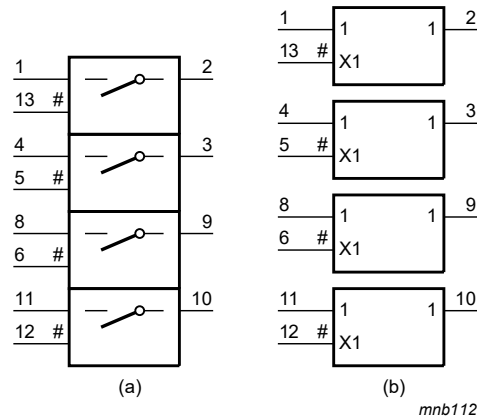


Fig. 2. Logic symbol (IEEE/IEC)

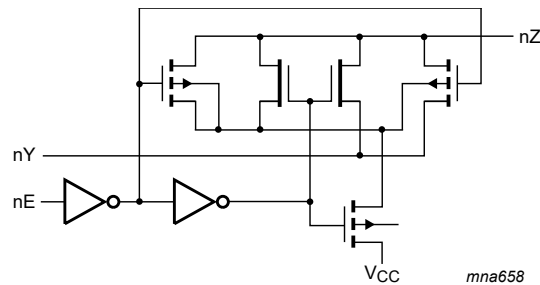
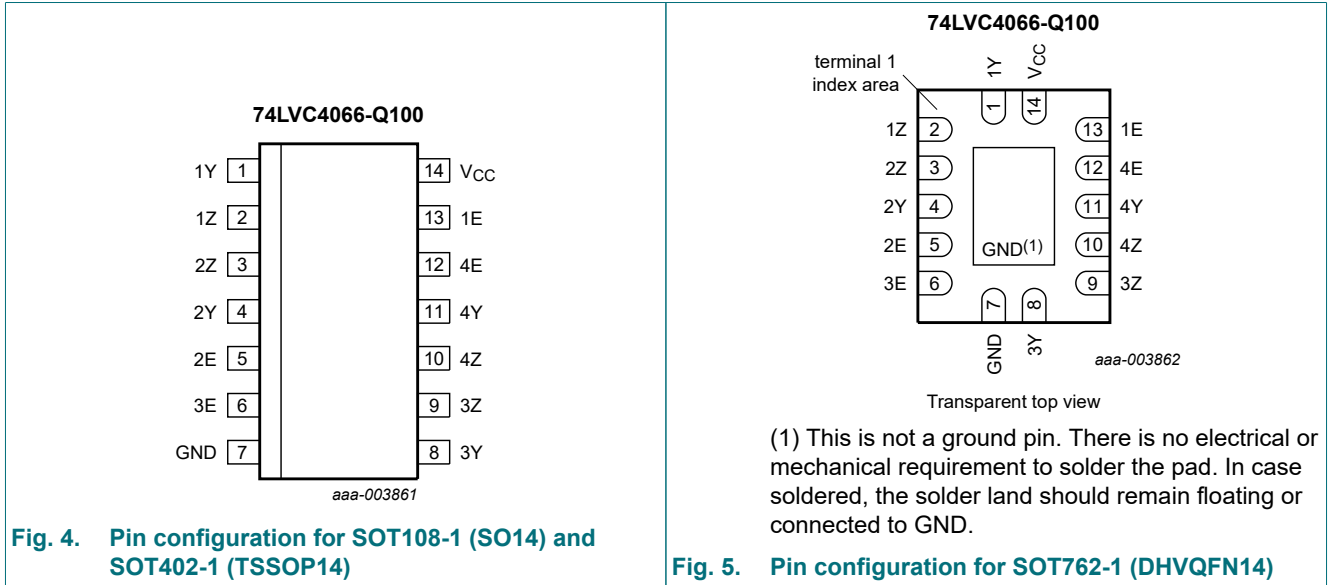


Fig. 3. Logic diagram (one switch)

## 5. Pinning information

### 5.1. Pinning



### 5.2. Pin description

Table 2. Pin description

| Symbol          | Pin          | Description                |
|-----------------|--------------|----------------------------|
| 1Y, 2Y, 3Y, 4Y  | 1, 4, 8, 11  | independent input/output   |
| 1Z, 2Z, 3Z, 4Z  | 2, 3, 9, 10  | independent output/input   |
| 1E, 2E, 3E, 4E  | 13, 5, 6, 12 | enable input (active HIGH) |
| GND             | 7            | ground (0 V)               |
| V <sub>CC</sub> | 14           | supply voltage             |

## 6. Functional description

Table 3. Function table

H = HIGH voltage level; L = LOW voltage level.

| Input nE | Switch |
|----------|--------|
| L        | OFF    |
| H        | ON     |

## 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 | +6.5     | V    |
| $V_I$     | input voltage           | [1]  | -0.5 | +6.5     | V    |
| $I_{IK}$  | input clamping current  | $V_I < -0.5 \text{ V}$ or $V_I < V_{CC} + 0.5 \text{ V}$ | -50  | -        | mA   |
| $I_{SK}$  | switch clamping current | $V_I < -0.5 \text{ V}$ or $V_I < V_{CC} + 0.5 \text{ V}$ | -    | $\pm 50$ | mA   |
| $V_{SW}$  | switch voltage          | enable and disable mode [2]                              | -0.5 | +6.5     | V    |
| $I_{SW}$  | switch current          | $-0.5 < V_{SW} < V_{CC} + 0.5 \text{ V}$                 | -    | $\pm 50$ | mA   |
| $I_{CC}$  | supply current          |  | -    | 100      | mA   |
| $I_{GND}$ | ground current          |  | -100 | -        | mA   |
| $T_{stg}$ | storage temperature     |  | -65  | +150     | °C   |
| $P_{tot}$ | total power dissipation | $T_{amb} = -40 \text{ °C}$ to $+125 \text{ °C}$ [3]      | -    | 500      | mW   |

[1] The minimum input voltage rating may be exceeded if the input current rating is observed.

[2] The minimum and maximum switch voltage ratings may be exceeded if the switch clamping current rating is observed.

[3] For SOT108-1 (SO14) package:  $P_{tot}$  derates linearly with 10.1 mW/K above 100 °C.

For SOT402-1 (TSSOP14) package:  $P_{tot}$  derates linearly with 7.3 mW/K above 81 °C.

For SOT762-1 (DHVQFN14) package:  $P_{tot}$  derates linearly with 9.6 mW/K above 98 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

| Symbol              | Parameter                           | Conditions                                       | Min  | Typ | Max      | Unit |
|---------------------|-------------------------------------|--|------|-----|----------|------|
| $V_{CC}$            | supply voltage                      |  | 1.65 | -   | 5.5      | V    |
| $V_I$               | input voltage                       |  | 0    | -   | 5.5      | V    |
| $V_{SW}$            | switch voltage                      | [1]  | 0    | -   | $V_{CC}$ | V    |
| $T_{amb}$           | ambient temperature                 |  | -40  | -   | +125     | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 1.65 \text{ V}$ to $2.7 \text{ V}$ [2] | -    | -   | 20       | ns/V |
|                     |                                     | $V_{CC} = 2.7 \text{ V}$ to $5.5 \text{ V}$ [2]  | -    | -   | 10       | ns/V |

[1] To avoid sinking GND current from terminal nZ when switch current flows in terminal nY, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal nZ, no GND current will flow from terminal nY. In this case, there is no limit for the voltage drop across the switch.

[2] Applies to control signal levels.

## 9. Static characteristics

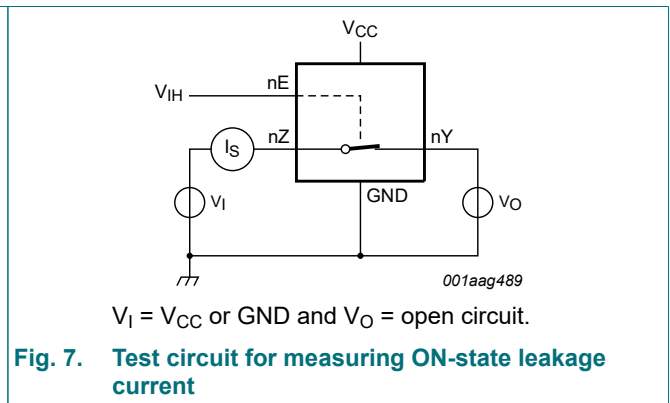
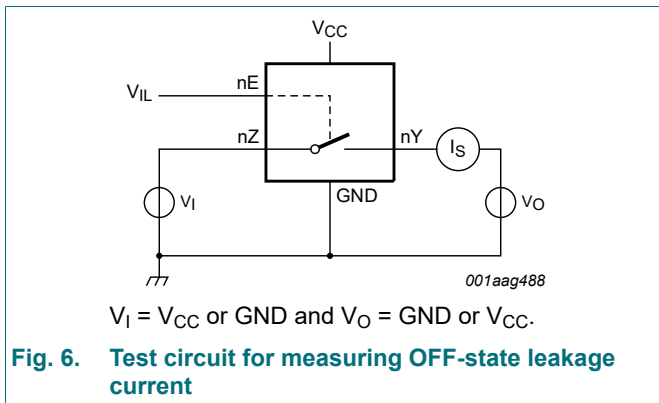
**Table 6. Static characteristics**

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

| Symbol              | Parameter                 | Conditions  | -40 °C to +85 °C    |         |                     | -40 °C to +125 °C   |                     | Unit |
|---------------------|---------------------------|---|---------------------|---------|---------------------|---------------------|---------------------|------|
|                     |                           |   | Min                 | Typ [1] | Max                 | Min                 | Max                 |      |
| V <sub>IH</sub>     | HIGH-level input voltage  | V <sub>CC</sub> = 1.65 V to 1.95 V  | 0.65V <sub>CC</sub> | -       | -                   | 0.65V <sub>CC</sub> | -                   | V    |
|                     |                           | V <sub>CC</sub> = 2.3 V to 2.7 V  | 1.7                 | -       | -                   | 1.7                 | -                   | V    |
|                     |                           | V <sub>CC</sub> = 2.7 V to 3.6 V  | 2.0                 | -       | -                   | 2.0                 | -                   | V    |
|                     |                           | V <sub>CC</sub> = 4.5 V to 5.5 V  | 0.7V <sub>CC</sub>  | -       | -                   | 0.7V <sub>CC</sub>  | -                   | V    |
| V <sub>IL</sub>     | LOW-level input voltage   | V <sub>CC</sub> = 1.65 V to 1.95 V  | -                   | -       | 0.35V <sub>CC</sub> | -                   | 0.35V <sub>CC</sub> | V    |
|                     |                           | V <sub>CC</sub> = 2.3 V to 2.7 V  | -                   | -       | 0.7                 | -                   | 0.7                 | V    |
|                     |                           | V <sub>CC</sub> = 2.7 V to 3.6 V  | -                   | -       | 0.8                 | -                   | 0.8                 | V    |
|                     |                           | V <sub>CC</sub> = 4.5 V to 5.5 V  | -                   | -       | 0.3V <sub>CC</sub>  | -                   | 0.3V <sub>CC</sub>  | V    |
| I <sub>I</sub>      | input leakage current     | pin nE; V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = 5.5 V or GND [2]  | -                   | ±0.1    | ±5                  | -                   | ±20                 | µA   |
| I <sub>S(OFF)</sub> | OFF-state leakage current | V <sub>SW</sub>   = V <sub>CC</sub> - GND; V <sub>CC</sub> = 5.5 V; see Fig. 6 [2]                                      | -                   | ±0.1    | ±5                  | -                   | ±20                 | µA   |
| I <sub>S(ON)</sub>  | ON-state leakage current  | V <sub>SW</sub>   = V <sub>CC</sub> - GND; V <sub>CC</sub> = 5.5 V; see Fig. 7 [2]                                      | -                   | ±0.1    | ±5                  | -                   | ±20                 | µA   |
| I <sub>CC</sub>     | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>SW</sub> = GND or V <sub>CC</sub> ; V <sub>CC</sub> = 5.5 V [2]         | -                   | 0.1     | 10                  | -                   | 40                  | µA   |
| ΔI <sub>CC</sub>    | additional supply current | pin nE; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; V <sub>CC</sub> = 5.5 V; V <sub>SW</sub> = GND or V <sub>CC</sub> [2] | -                   | 5       | 500                 | -                   | 5000                | µA   |
| C <sub>I</sub>      | input capacitance         |   | -                   | 12.5    | -                   | -                   | -                   | pF   |
| C <sub>S(OFF)</sub> | OFF-state capacitance     |   | -                   | 8.0     | -                   | -                   | -                   | pF   |
| C <sub>S(ON)</sub>  | ON-state capacitance      |   | -                   | 14.0    | -                   | -                   | -                   | pF   |

- [1] All typical values are measured at T<sub>amb</sub> = 25 °C.
- [2] These typical values are measured at V<sub>CC</sub> = 3.3 V.

### 9.1. Test circuits



## 9.2. ON resistance

**Table 7. ON resistance**

At recommended operating conditions; voltages are referenced to GND (ground 0 V); for graphs see [Fig. 9](#) to [Fig. 14](#).

| Symbol                | Parameter                | Conditions   | -40 °C to +85 °C |         |     | -40 °C to +125 °C |     | Unit |
|-----------------------|--------------------------|--|------------------|---------|-----|-------------------|-----|------|
|                       |                          |  | Min              | Typ [1] | Max | Min               | Max |      |
| R <sub>ON(peak)</sub> | ON resistance (peak)     | V <sub>I</sub> = GND to V <sub>CC</sub> ; see <a href="#">Fig. 8</a> |                  |         |     |                   |     |      |
|                       |                          | I <sub>SW</sub> = 4 mA; V <sub>CC</sub> = 1.65 V to 1.95 V           | -                | 34.0    | 130 | -                 | 195 | Ω    |
|                       |                          | I <sub>SW</sub> = 8 mA; V <sub>CC</sub> = 2.3 V to 2.7 V             | -                | 12.0    | 30  | -                 | 45  | Ω    |
|                       |                          | I <sub>SW</sub> = 12 mA; V <sub>CC</sub> = 2.7 V                     | -                | 10.4    | 25  | -                 | 38  | Ω    |
|                       |                          | I <sub>SW</sub> = 24 mA; V <sub>CC</sub> = 3 V to 3.6 V              | -                | 7.8     | 20  | -                 | 30  | Ω    |
|                       |                          | I <sub>SW</sub> = 32 mA; V <sub>CC</sub> = 4.5 V to 5.5 V            | -                | 6.2     | 15  | -                 | 23  | Ω    |
| R <sub>ON(rail)</sub> | ON resistance (rail)     | V <sub>I</sub> = GND; see <a href="#">Fig. 8</a>                     |                  |         |     |                   |     |      |
|                       |                          | I <sub>SW</sub> = 4 mA; V <sub>CC</sub> = 1.65 V to 1.95 V           | -                | 8.2     | 18  | -                 | 27  | Ω    |
|                       |                          | I <sub>SW</sub> = 8 mA; V <sub>CC</sub> = 2.3 V to 2.7 V             | -                | 7.1     | 16  | -                 | 24  | Ω    |
|                       |                          | I <sub>SW</sub> = 12 mA; V <sub>CC</sub> = 2.7 V                     | -                | 6.9     | 14  | -                 | 21  | Ω    |
|                       |                          | I <sub>SW</sub> = 24 mA; V <sub>CC</sub> = 3 V to 3.6 V              | -                | 6.5     | 12  | -                 | 18  | Ω    |
|                       |                          | I <sub>SW</sub> = 32 mA; V <sub>CC</sub> = 4.5 V to 5.5 V            | -                | 5.8     | 10  | -                 | 15  | Ω    |
|                       |                          | V <sub>I</sub> = V <sub>CC</sub> ; see <a href="#">Fig. 8</a>        |                  |         |     |                   |     |      |
|                       |                          | I <sub>SW</sub> = 4 mA; V <sub>CC</sub> = 1.65 V to 1.95 V           | -                | 10.4    | 30  | -                 | 45  | Ω    |
|                       |                          | I <sub>SW</sub> = 8 mA; V <sub>CC</sub> = 2.3 V to 2.7 V             | -                | 7.6     | 20  | -                 | 30  | Ω    |
|                       |                          | I <sub>SW</sub> = 12 mA; V <sub>CC</sub> = 2.7 V                     | -                | 7.0     | 18  | -                 | 27  | Ω    |
|                       |                          | I <sub>SW</sub> = 24 mA; V <sub>CC</sub> = 3 V to 3.6 V              | -                | 6.1     | 15  | -                 | 23  | Ω    |
|                       |                          | I <sub>SW</sub> = 32 mA; V <sub>CC</sub> = 4.5 V to 5.5 V            | -                | 4.9     | 10  | -                 | 15  | Ω    |
| R <sub>ON(flat)</sub> | ON resistance (flatness) | V <sub>I</sub> = GND to V <sub>CC</sub> [2]                          |                  |         |     |                   |     |      |
|                       |                          | I <sub>SW</sub> = 4 mA; V <sub>CC</sub> = 1.65 V to 1.95 V           | -                | 26.0    | -   | -                 | -   | Ω    |
|                       |                          | I <sub>SW</sub> = 8 mA; V <sub>CC</sub> = 2.3 V to 2.7 V             | -                | 5.0     | -   | -                 | -   | Ω    |
|                       |                          | I <sub>SW</sub> = 12 mA; V <sub>CC</sub> = 2.7 V                     | -                | 3.5     | -   | -                 | -   | Ω    |
|                       |                          | I <sub>SW</sub> = 24 mA; V <sub>CC</sub> = 3 V to 3.6 V              | -                | 2.0     | -   | -                 | -   | Ω    |
|                       |                          | I <sub>SW</sub> = 32 mA; V <sub>CC</sub> = 4.5 V to 5.5 V            | -                | 1.5     | -   | -                 | -   | Ω    |

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and nominal V<sub>CC</sub>.

[2] Flatness is defined as the difference between the maximum and minimum value of ON resistance measured at identical V<sub>CC</sub> and temperature.

9.3. ON resistance test circuit and graphs

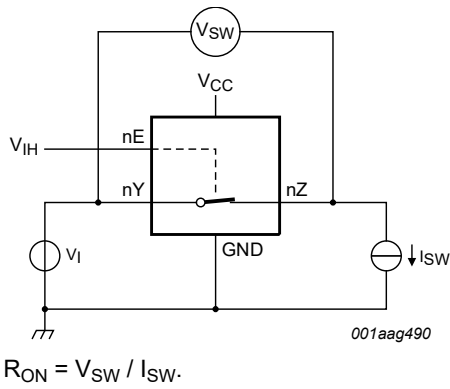
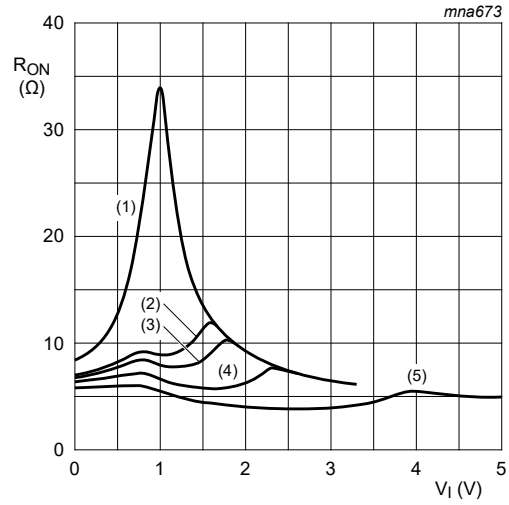
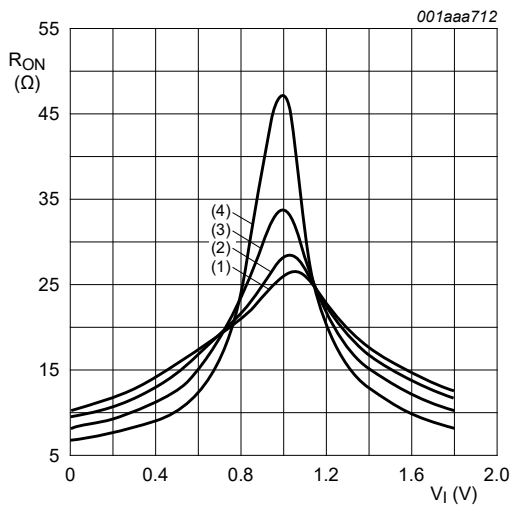


Fig. 8. Test circuit for measuring ON resistance



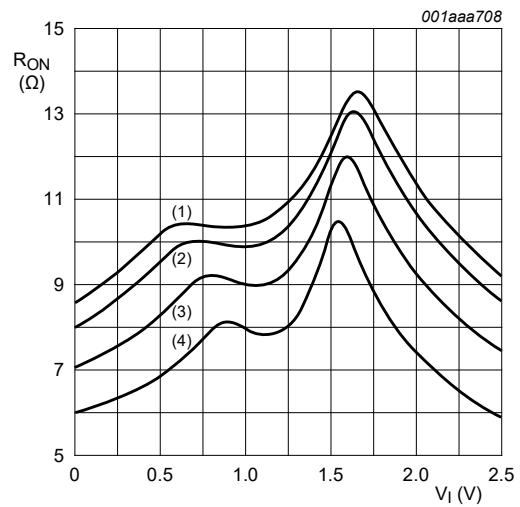
- (1)  $V_{CC} = 1.8$  V.
- (2)  $V_{CC} = 2.5$  V.
- (3)  $V_{CC} = 2.7$  V.
- (4)  $V_{CC} = 3.3$  V.
- (5)  $V_{CC} = 5.0$  V.

Fig. 9. Typical ON resistance as a function of input voltage;  $T_{amb} = 25$  °C



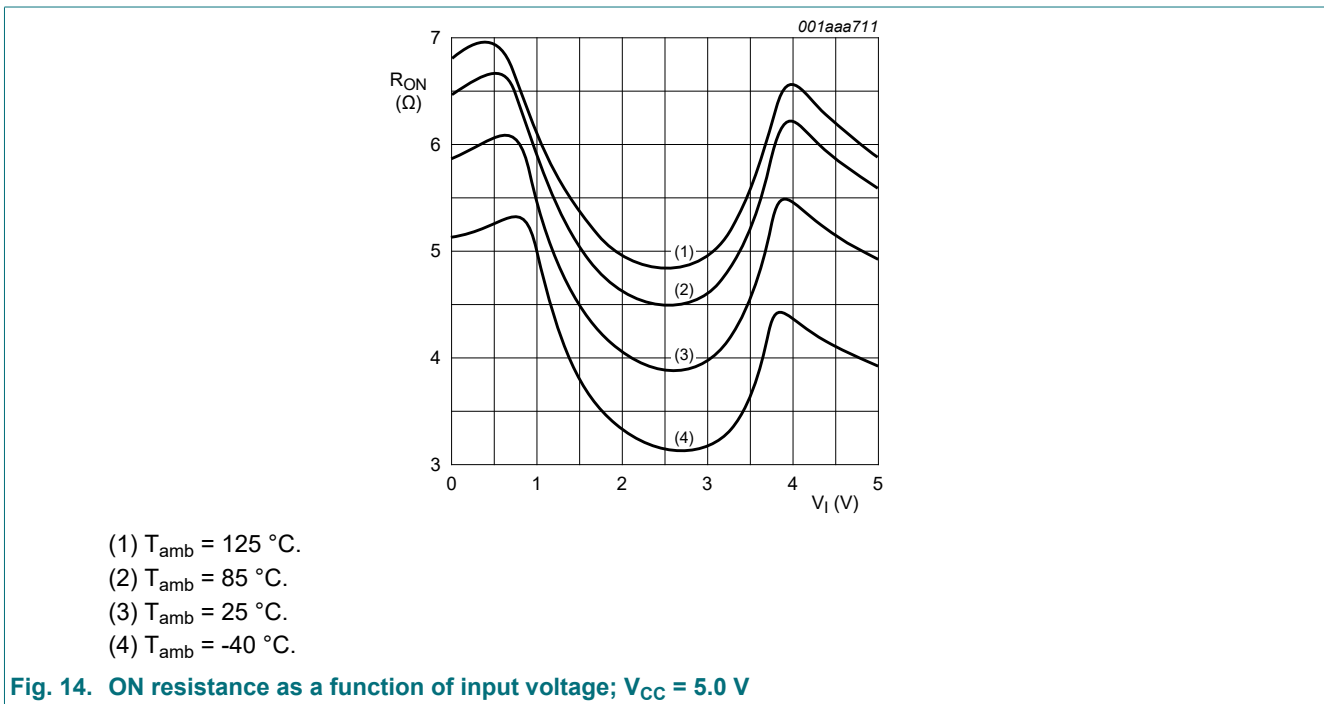
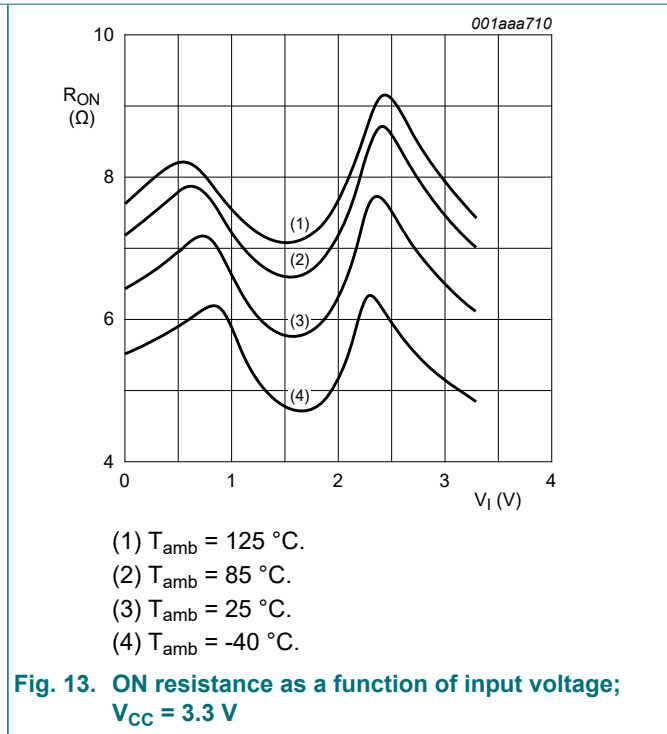
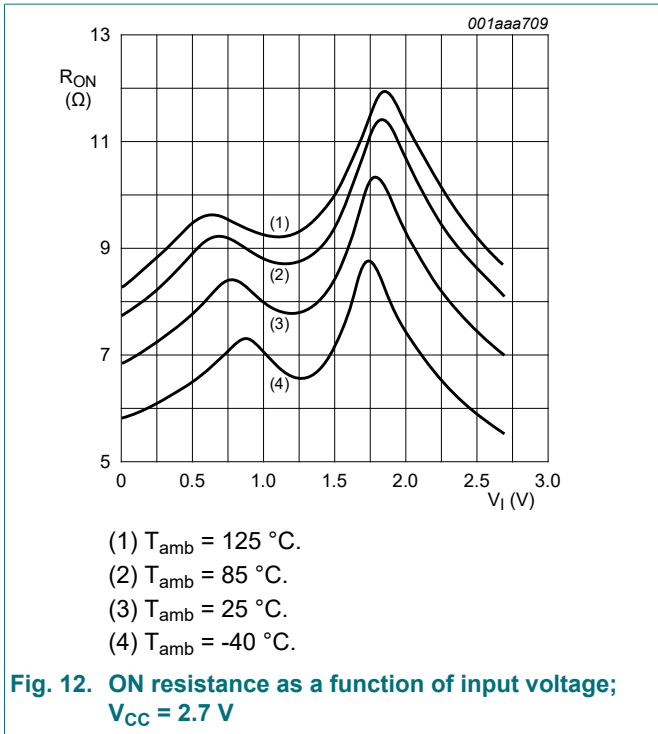
- (1)  $T_{amb} = 125$  °C.
- (2)  $T_{amb} = 85$  °C.
- (3)  $T_{amb} = 25$  °C.
- (4)  $T_{amb} = -40$  °C.

Fig. 10. ON resistance as a function of input voltage;  $V_{CC} = 1.8$  V



- (1)  $T_{amb} = 125$  °C.
- (2)  $T_{amb} = 85$  °C.
- (3)  $T_{amb} = 25$  °C.
- (4)  $T_{amb} = -40$  °C.

Fig. 11. ON resistance as a function of input voltage;  $V_{CC} = 2.5$  V





## 10. Dynamic characteristics

**Table 8. Dynamic characteristics**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 17.

| Symbol           | Parameter                     | Conditions   | -40 °C to +85 °C |         |     | -40 °C to +125 °C |      | Unit |
|------------------|-------------------------------|--|------------------|---------|-----|-------------------|------|------|
|                  |                               |  | Min              | Typ [1] | Max | Min               | Max  |      |
| t <sub>pd</sub>  | propagation delay             | nY to nZ or nZ to nY; see Fig. 15 [2] [3]  |                  |         |     |                   |      |      |
|                  |                               | V <sub>CC</sub> = 1.65 V to 1.95 V   | -                | 0.8     | 2.0 | -                 | 3.0  | ns   |
|                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V   | -                | 0.4     | 1.2 | -                 | 2.0  | ns   |
|                  |                               | V <sub>CC</sub> = 2.7 V  | -                | 0.4     | 1.0 | -                 | 1.5  | ns   |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V   | -                | 0.3     | 0.8 | -                 | 1.5  | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V   | -                | 0.2     | 0.6 | -                 | 1.0  | ns   |
| t <sub>en</sub>  | enable time                   | nE to nY or nZ; see Fig. 16 [4]  |                  |         |     |                   |      |      |
|                  |                               | V <sub>CC</sub> = 1.65 V to 1.95 V   | 1.0              | 5.3     | 10  | 1.0               | 12.5 | ns   |
|                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V   | 1.0              | 3.0     | 5.6 | 1.0               | 7.0  | ns   |
|                  |                               | V <sub>CC</sub> = 2.7 V  | 1.0              | 2.6     | 5.0 | 1.0               | 6.5  | ns   |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V   | 1.0              | 2.5     | 4.4 | 1.0               | 5.5  | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V   | 1.0              | 1.9     | 3.9 | 1.0               | 5.0  | ns   |
| t <sub>dis</sub> | disable time                  | nE to nY or nZ; see Fig. 16 [5]  |                  |         |     |                   |      |      |
|                  |                               | V <sub>CC</sub> = 1.65 V to 1.95 V   | 1.0              | 4.2     | 9.0 | 1.0               | 11.5 | ns   |
|                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V   | 1.0              | 2.4     | 5.5 | 1.0               | 7.0  | ns   |
|                  |                               | V <sub>CC</sub> = 2.7 V  | 1.0              | 3.6     | 6.5 | 1.0               | 8.5  | ns   |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V   | 1.0              | 3.4     | 6.0 | 1.0               | 7.5  | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V   | 1.0              | 2.5     | 5.0 | 1.0               | 6.5  | ns   |
| C <sub>PD</sub>  | power dissipation capacitance | C <sub>L</sub> = 50 pF; f <sub>i</sub> = 10 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> [6] |                  |         |     |                   |      |      |
|                  |                               | V <sub>CC</sub> = 2.5 V  | -                | 11.0    | -   | -                 | -    | pF   |
|                  |                               | V <sub>CC</sub> = 3.3 V  | -                | 12.5    | -   | -                 | -    | pF   |
|                  |                               | V <sub>CC</sub> = 5.0 V  | -                | 15.6    | -   | -                 | -    | pF   |

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and nominal V<sub>CC</sub>.

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

[3] Propagation delay is the calculated RC time constant of the typical ON resistance of the switch and the specified capacitance when driven by an ideal voltage source (zero output impedance).

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

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

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

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

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;

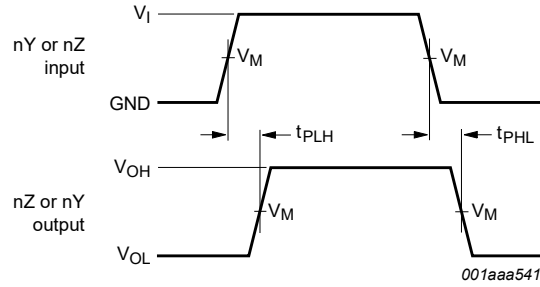
C<sub>S(ON)</sub> = maximum ON-state switch capacitance in pF;

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

N = number of inputs switching;

∑{(C<sub>L</sub> + C<sub>S(ON)</sub>) × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>} = sum of the outputs.

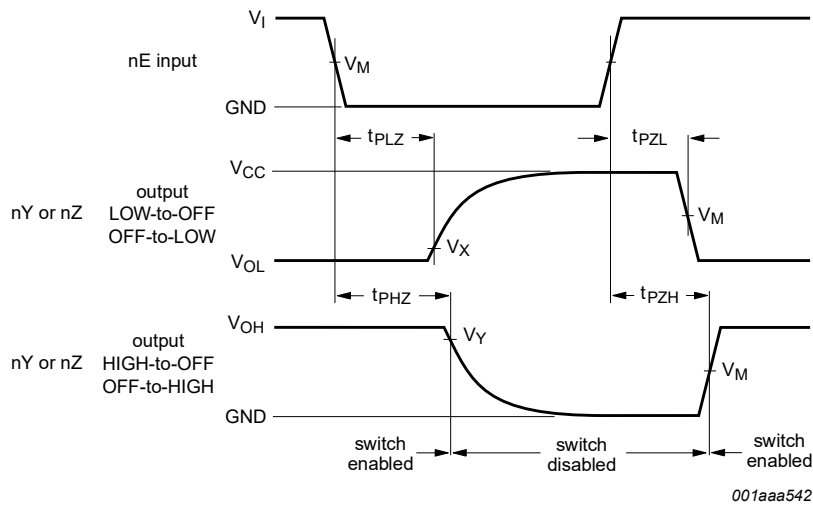
10.1. Waveforms and test circuit



Measurement points are given in [Table 9](#).

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

Fig. 15. Input (nY or nZ) to output (nZ or nY) propagation delays



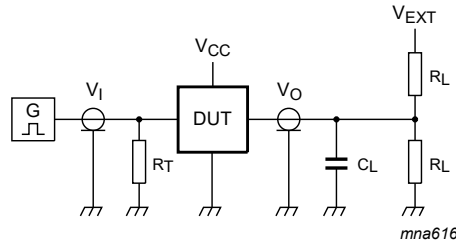
Measurement points are given in [Table 9](#).

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

Fig. 16. Enable and disable times

Table 9. Measurement points

| Supply voltage   | Input       | Output       |                   |                   |
|------------------|-------------|--------------|-------------------|-------------------|
| $V_{CC}$         | $V_M$       | $V_M$        | $V_X$             | $V_Y$             |
| 1.65 V to 1.95 V | $0.5V_{CC}$ | $0.5 V_{CC}$ | $V_{OL} + 0.15 V$ | $V_{OH} - 0.15 V$ |
| 2.3 V to 2.7 V   | $0.5V_{CC}$ | $0.5V_{CC}$  | $V_{OL} + 0.15 V$ | $V_{OH} - 0.15 V$ |
| 2.7 V            | 1.5 V       | 1.5 V        | $V_{OL} + 0.3 V$  | $V_{OH} - 0.3 V$  |
| 3.0 V to 3.6 V   | 1.5 V       | 1.5 V        | $V_{OL} + 0.3 V$  | $V_{OH} - 0.3 V$  |
| 4.5 V to 5.5 V   | $0.5V_{CC}$ | $0.5V_{CC}$  | $V_{OL} + 0.3 V$  | $V_{OH} - 0.3 V$  |



Test data is given in [Table 10](#).

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.

$V_{EXT}$  = External voltage for measuring switching times.

**Fig. 17. Test circuit for measuring switching times**

**Table 10. Test data**

| Supply voltage   | Input    |               | Load  |              | $V_{EXT}$          |                    |                    |
|------------------|----------|---------------|-------|--------------|--------------------|--------------------|--------------------|
| $V_{CC}$         | $V_I$    | $t_r, t_f$    | $C_L$ | $R_L$        | $t_{PLH}, t_{PHL}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ |
| 1.65 V to 1.95 V | $V_{CC}$ | $\leq 2.0$ ns | 30 pF | 1 k $\Omega$ | open               | GND                | $2V_{CC}$          |
| 2.3 V to 2.7 V   | $V_{CC}$ | $\leq 2.0$ ns | 30 pF | 500 $\Omega$ | open               | GND                | $2V_{CC}$          |
| 2.7 V            | 2.7 V    | $\leq 2.5$ ns | 50 pF | 500 $\Omega$ | open               | GND                | 6 V                |
| 3.0 V to 3.6 V   | 2.7 V    | $\leq 2.5$ ns | 50 pF | 500 $\Omega$ | open               | GND                | 6 V                |
| 4.5 V to 5.5 V   | $V_{CC}$ | $\leq 2.5$ ns | 50 pF | 500 $\Omega$ | open               | GND                | $2V_{CC}$          |

## 10.2. Additional dynamic characteristics

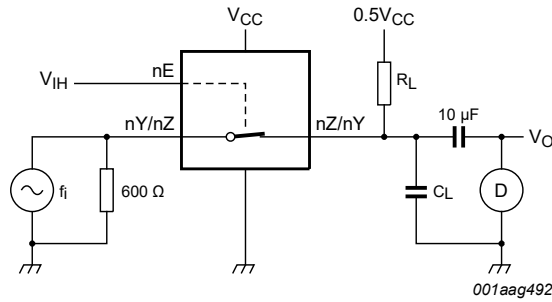
**Table 11. Additional dynamic characteristics**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V);  $T_{amb} = 25$  °C.

| Symbol | Parameter                 | Conditions   | Min | Typ   | Max | Unit |  |
|--------|---------------------------|--|-----|-------|-----|------|--|
| THD    | total harmonic distortion | $R_L = 10$ k $\Omega$ ; $C_L = 50$ pF; $f_i = 1$ kHz; see <a href="#">Fig. 18</a>  |     |       |     |      |  |
|        |                           | $V_{CC} = 1.65$ V  | -   | 0.032 | -   | %    |  |
|        |                           | $V_{CC} = 2.3$ V   | -   | 0.008 | -   | %    |  |
|        |                           | $V_{CC} = 3$ V   | -   | 0.006 | -   | %    |  |
|        |                           | $V_{CC} = 4.5$ V   | -   | 0.005 | -   | %    |  |
|        |                           | $R_L = 10$ k $\Omega$ ; $C_L = 50$ pF; $f_i = 10$ kHz; see <a href="#">Fig. 18</a> |     |       |     |      |  |
|        |                           | $V_{CC} = 1.65$ V  | -   | 0.068 | -   | %    |  |
|        |                           | $V_{CC} = 2.3$ V   | -   | 0.009 | -   | %    |  |
|        |                           | $V_{CC} = 3$ V   | -   | 0.008 | -   | %    |  |
|        |                           | $V_{CC} = 4.5$ V   | -   | 0.006 | -   | %    |  |

| Symbol                   | Parameter                | Conditions   | Min              | Typ   | Max | Unit |   |    |
|--------------------------|--------------------------|--|------------------|---|-----|------|---|----|
| $f_{(-3dB)}$             | -3 dB frequency response | $R_L = 600 \Omega$ ; $C_L = 50 \text{ pF}$ ; see <a href="#">Fig. 19</a>   |                  |   |     |      |   |    |
|                          |                          | $V_{CC} = 1.65 \text{ V}$  | -                | 170   | -   | MHz  |   |    |
|                          |                          | $V_{CC} = 2.3 \text{ V}$   | -                | 210   | -   | MHz  |   |    |
|                          |                          | $V_{CC} = 3 \text{ V}$   | -                | 212   | -   | MHz  |   |    |
|                          |                          | $V_{CC} = 4.5 \text{ V}$   | -                | 215   | -   | MHz  |   |    |
|                          |                          | $R_L = 50 \Omega$ ; $C_L = 5 \text{ pF}$ ; see <a href="#">Fig. 19</a>   |                  |   |     |      |   |    |
|                          |                          | $V_{CC} = 1.65 \text{ V}$  | -                | > 500   | -   | MHz  |   |    |
|                          |                          | $V_{CC} = 2.3 \text{ V}$   | -                | > 500   | -   | MHz  |   |    |
|                          |                          | $V_{CC} = 3 \text{ V}$   | -                | > 500   | -   | MHz  |   |    |
|                          |                          | $V_{CC} = 4.5 \text{ V}$   | -                | > 500   | -   | MHz  |   |    |
| $\alpha_{iso}$           | isolation (OFF-state)    | $R_L = 600 \Omega$ ; $C_L = 50 \text{ pF}$ ; $f_i = 1 \text{ MHz}$ ; see <a href="#">Fig. 20</a>   |                  |   |     |      |   |    |
|                          |                          | $V_{CC} = 1.65 \text{ V}$  | -                | -46   | -   | dB   |   |    |
|                          |                          | $V_{CC} = 2.3 \text{ V}$   | -                | -46   | -   | dB   |   |    |
|                          |                          | $V_{CC} = 3 \text{ V}$   | -                | -46   | -   | dB   |   |    |
|                          |                          | $V_{CC} = 4.5 \text{ V}$   | -                | -46   | -   | dB   |   |    |
|                          |                          | $R_L = 50 \Omega$ ; $C_L = 5 \text{ pF}$ ; $f_i = 1 \text{ MHz}$ ; see <a href="#">Fig. 20</a>   |                  |   |     |      |   |    |
|                          |                          | $V_{CC} = 1.65 \text{ V}$  | -                | -42   | -   | dB   |   |    |
|                          |                          | $V_{CC} = 2.3 \text{ V}$   | -                | -42   | -   | dB   |   |    |
|                          |                          | $V_{CC} = 3 \text{ V}$   | -                | -42   | -   | dB   |   |    |
|                          |                          | $V_{CC} = 4.5 \text{ V}$   | -                | -42   | -   | dB   |   |    |
| $V_{ct}$                 | crosstalk voltage        | between digital inputs and switch; $R_L = 600 \Omega$ ; $C_L = 50 \text{ pF}$ ; $f_i = 1 \text{ MHz}$ ; $t_r = t_f = 2 \text{ ns}$ ; see <a href="#">Fig. 21</a> |                  |   |     |      |   |    |
|                          |                          | $V_{CC} = 1.65 \text{ V}$  | -                | 69  | -   | mV   |   |    |
|                          |                          | $V_{CC} = 2.3 \text{ V}$   | -                | 87  | -   | mV   |   |    |
|                          |                          | $V_{CC} = 3 \text{ V}$   | -                | 156   | -   | mV   |   |    |
|                          |                          | $V_{CC} = 4.5 \text{ V}$   | -                | 302   | -   | mV   |   |    |
| Xtalk                    | crosstalk                | between switches; $R_L = 600 \Omega$ ; $C_L = 50 \text{ pF}$ ; $f_i = 1 \text{ MHz}$ ; see <a href="#">Fig. 22</a>   |                  |   |     |      |   |    |
|                          |                          | $V_{CC} = 1.65 \text{ V}$  | -                | -58   | -   | dB   |   |    |
|                          |                          | $V_{CC} = 2.3 \text{ V}$   | -                | -58   | -   | dB   |   |    |
|                          |                          | $V_{CC} = 3 \text{ V}$   | -                | -58   | -   | dB   |   |    |
|                          |                          | $V_{CC} = 4.5 \text{ V}$   | -                | -58   | -   | dB   |   |    |
|                          |                          | between switches; $R_L = 50 \Omega$ ; $C_L = 5 \text{ pF}$ ; $f_i = 1 \text{ MHz}$ ; see <a href="#">Fig. 22</a>   |                  |   |     |      |   |    |
|                          |                          | $V_{CC} = 1.65 \text{ V}$  | -                | -58   | -   | dB   |   |    |
|                          |                          | $V_{CC} = 2.3 \text{ V}$   | -                | -58   | -   | dB   |   |    |
|                          |                          | $V_{CC} = 3 \text{ V}$   | -                | -58   | -   | dB   |   |    |
|                          |                          | $V_{CC} = 4.5 \text{ V}$   | -                | -58   | -   | dB   |   |    |
|                          |                          | $Q_{inj}$  | charge injection | $C_L = 0.1 \text{ nF}$ ; $V_{gen} = 0 \text{ V}$ ; $R_{gen} = 0 \Omega$ ; $f_i = 1 \text{ MHz}$ ; $R_L = 1 \text{ M}\Omega$ ; see <a href="#">Fig. 23</a> |     |      |   |    |
|                          |                          |  |                  | $V_{CC} = 1.8 \text{ V}$  | -   | 3.3  | - | pC |
|                          |                          |  |                  | $V_{CC} = 2.5 \text{ V}$  | -   | 4.1  | - | pC |
| $V_{CC} = 3.3 \text{ V}$ | -                        |  |                  | 5.0   | -   | pC   |   |    |
| $V_{CC} = 4.5 \text{ V}$ | -                        |  |                  | 6.4   | -   | pC   |   |    |
| $V_{CC} = 5.5 \text{ V}$ | -                        |  |                  | 7.5   | -   | pC   |   |    |

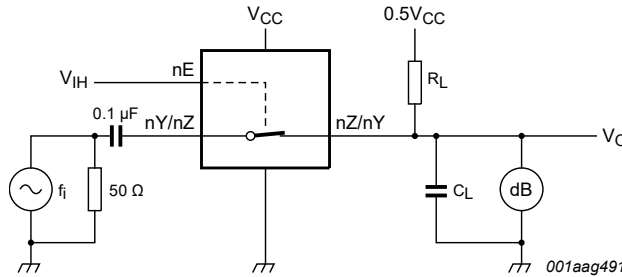
10.3. Test circuits



Test conditions:

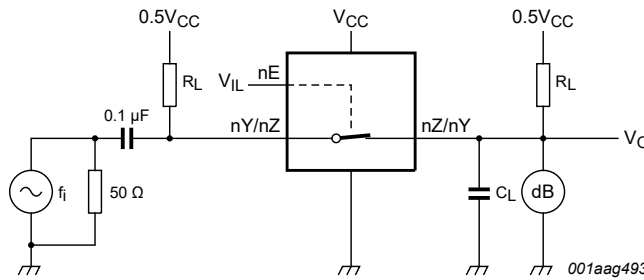
- $V_{CC} = 1.65\text{ V}; V_i = 1.4\text{ V (p-p)}$ .
- $V_{CC} = 2.3\text{ V}; V_i = 2\text{ V (p-p)}$ .
- $V_{CC} = 3\text{ V}; V_i = 2.5\text{ V (p-p)}$ .
- $V_{CC} = 4.5\text{ V}; V_i = 4\text{ V (p-p)}$ .

Fig. 18. Test circuit for measuring total harmonic distortion



Adjust  $f_i$  voltage to obtain 0 dBm level at output. Increase  $f_i$  frequency until dB meter reads -3 dB.

Fig. 19. Test circuit for measuring the frequency response when switch is in ON-state



Adjust  $f_i$  voltage to obtain 0 dBm level at input.

Fig. 20. Test circuit for measuring isolation (OFF-state)

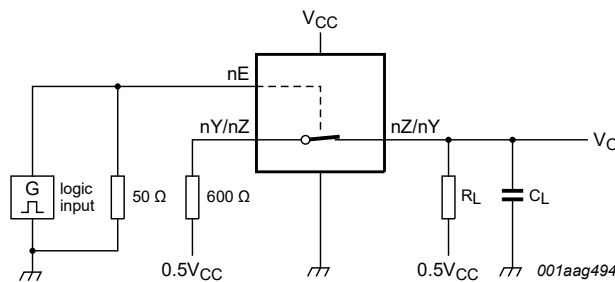
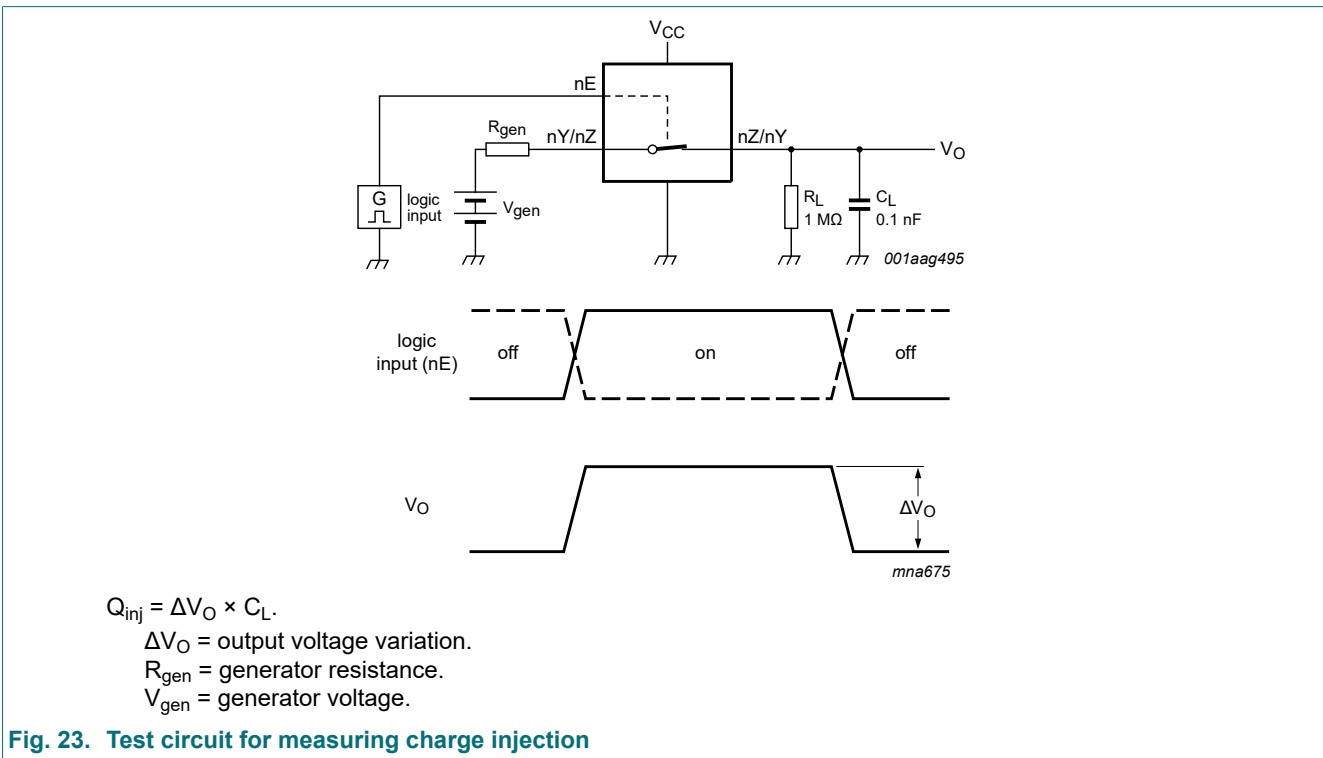
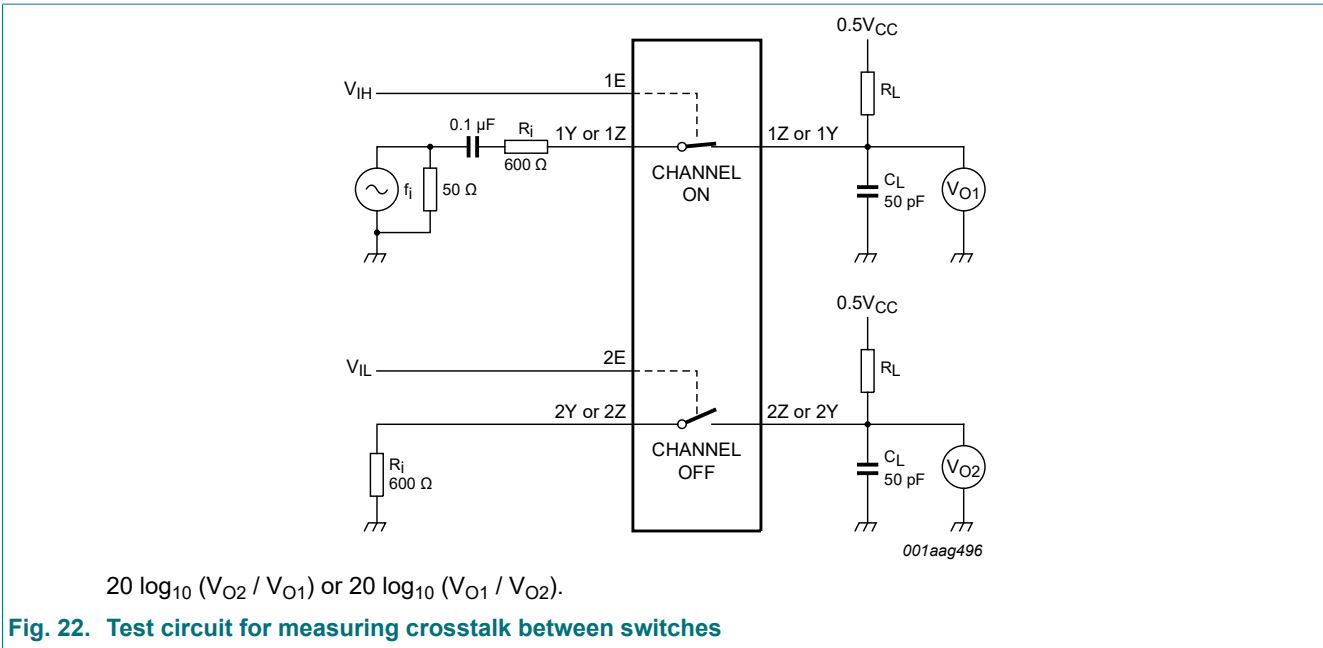


Fig. 21. Test circuit for measuring crosstalk voltage (between digital inputs and switch)



### 11. Package outline

SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1

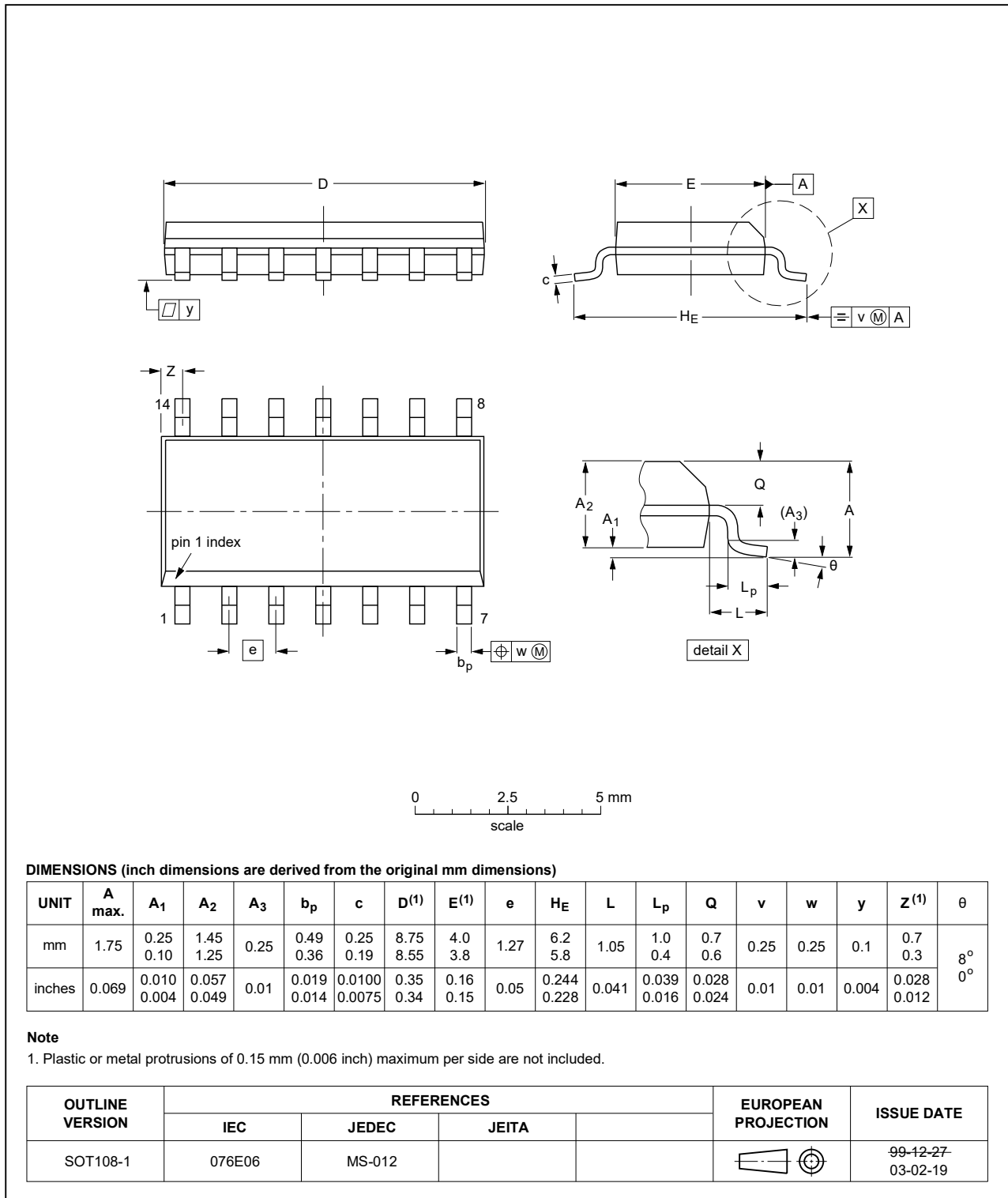


Fig. 24. Package outline SOT108-1 (SO14)

TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm

SOT402-1

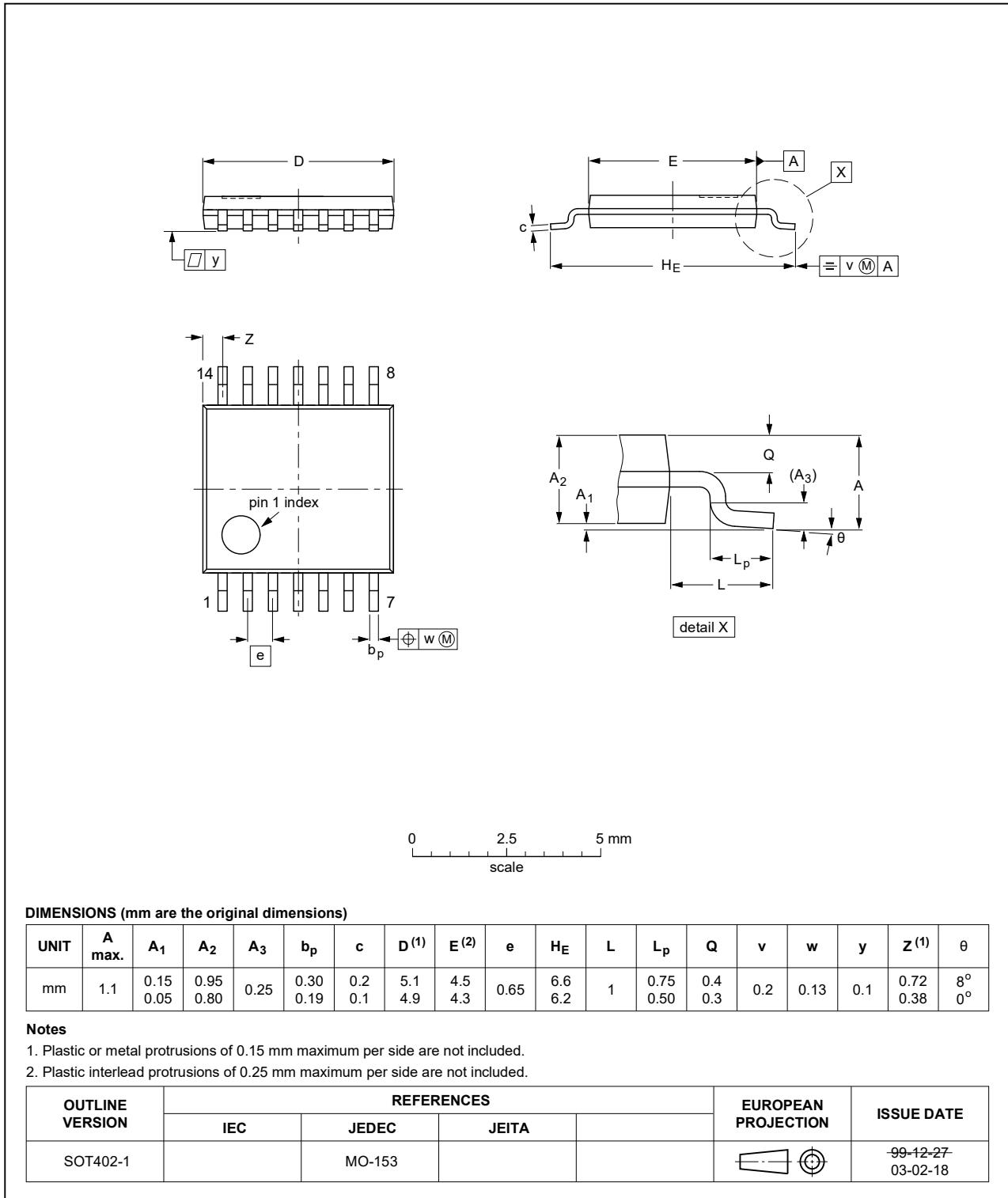


Fig. 25. Package outline SOT402-1 (TSSOP14)



DHVQFN14: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 x 3 x 0.85 mm

SOT762-1

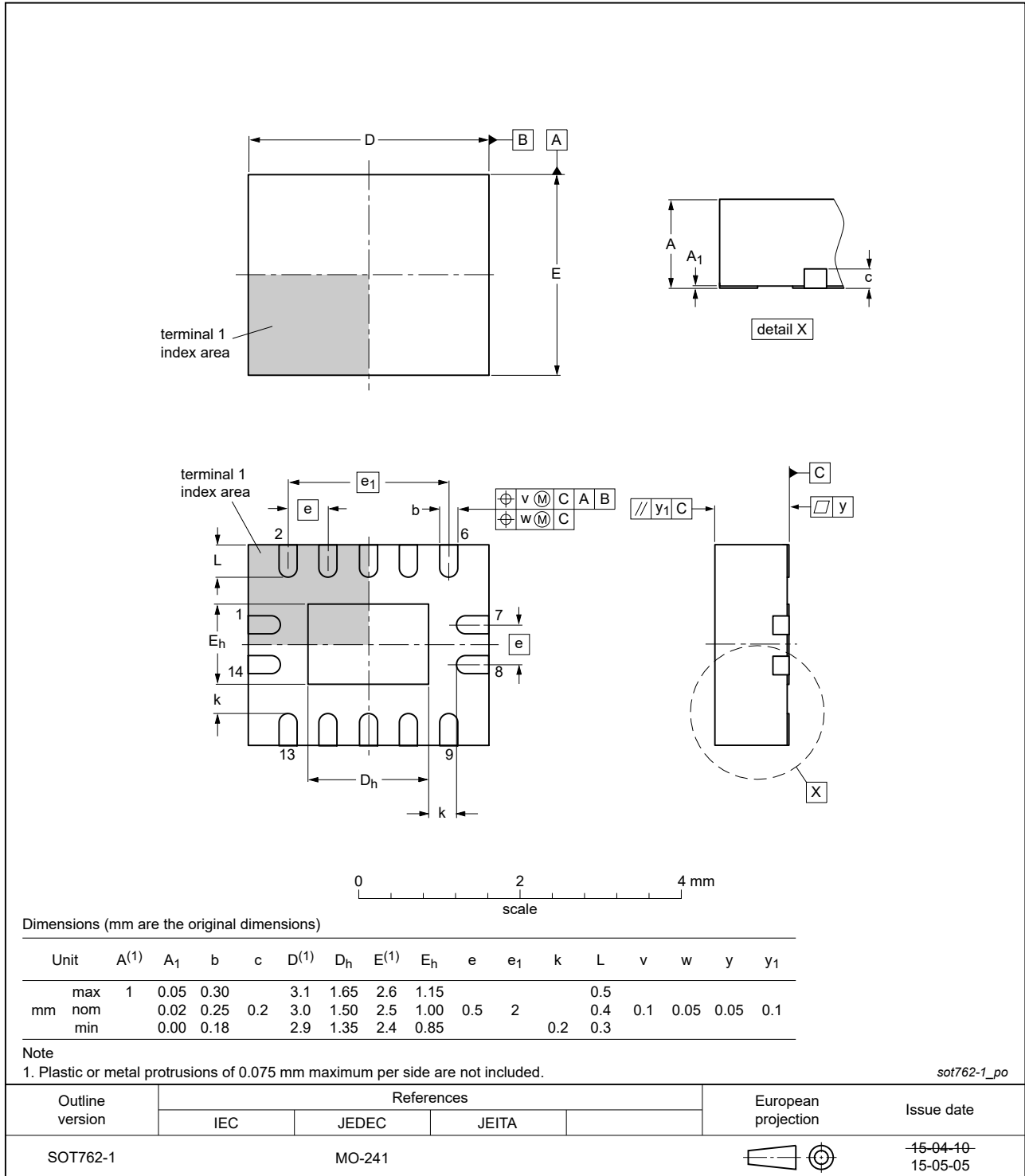


Fig. 26. Package outline SOT762-1 (DHVQFN14)

## 12. Abbreviations

Table 12. 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 13. Revision history

| Document ID        | Release date   | Data sheet status  | Change notice | Supersedes         |
|--------------------|--|--------------------|---------------|--------------------|
| 74LVC4066_Q100 v.2 | 20200326   | Product data sheet | -             | 74LVC4066_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 updated.</li> <li><a href="#">Fig. 26</a>: Package outline drawing SOT762-1 (DHVQFN14) updated.</li> </ul> |                    |               |                    |
| 74LVC4066_Q100 v.1 | 20120807   | 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".
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- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А