

# 74HC4066; 74HCT4066

## Quad single-pole single-throw analog switch

Rev. 11 — 21 March 2024

Product data sheet

### 1. General description

The 74HC4066; 74HCT4066 is a quad single pole, single throw analog switch. Each switch features two input/output terminals (nY and nZ) and an active HIGH enable input (nE). When nE is LOW, the analog switch is turned off. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ .

### 2. Features and benefits

- Input levels nE inputs:
  - For 74HC4066: CMOS level
  - For 74HCT4066: TTL level
- Low ON resistance:
  - 50  $\Omega$  (typical) at  $V_{CC} = 4.5$  V
  - 45  $\Omega$  (typical) at  $V_{CC} = 6.0$  V
  - 35  $\Omega$  (typical) at  $V_{CC} = 9.0$  V
- Specified in compliance with JEDEC standard no. 7A
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Multiple package options
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

### 3. Ordering information

Table 1. Ordering information

| Type number                 | Package           |          |  | Version                  |
|-----------------------------|-------------------|----------|--|--------------------------|
|                             | Temperature range | Name     | Description  |                          |
| <a href="#">74HC4066D</a>   | -40 °C to +125 °C | SO14     | plastic small outline package; 14 leads;<br>body width 3.9 mm  | <a href="#">SOT108-1</a> |
| <a href="#">74HCT4066D</a>  |                   |          |  |                          |
| <a href="#">74HC4066PW</a>  | -40 °C to +125 °C | TSSOP14  | plastic thin shrink small outline package; 14 leads;<br>body width 4.4 mm  | <a href="#">SOT402-1</a> |
| <a href="#">74HCT4066PW</a> |                   |          |  |                          |
| <a href="#">74HC4066BQ</a>  | -40 °C to +125 °C | DHVQFN14 | plastic dual in-line compatible thermal enhanced<br>very thin quad flat package; no leads; 14 terminals;<br>body 2.5 × 3 × 0.85 mm | <a href="#">SOT762-1</a> |
| <a href="#">74HCT4066BQ</a> |                   |          |  |                          |

### 4. Functional diagram

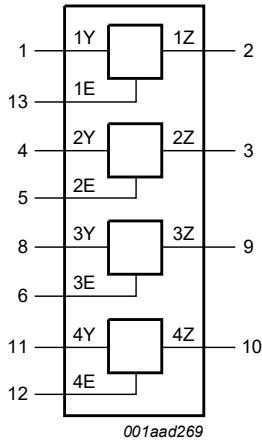


Fig. 1. Logic symbol

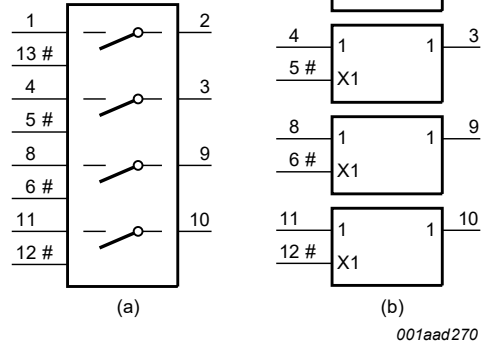


Fig. 2. IEC logic symbol

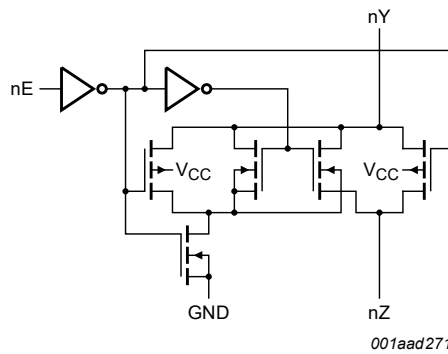


Fig. 3. Schematic diagram (one switch)

### 5. Pinning information

#### 5.1. Pinning

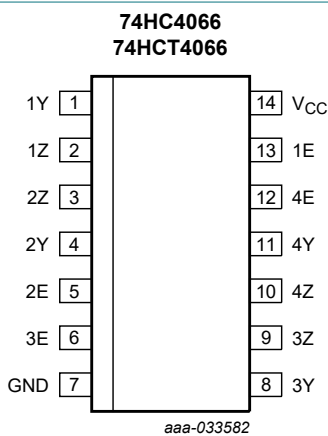


Fig. 4. Pin configuration SOT108-1 (SO14)

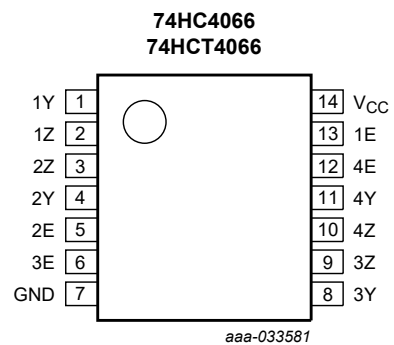
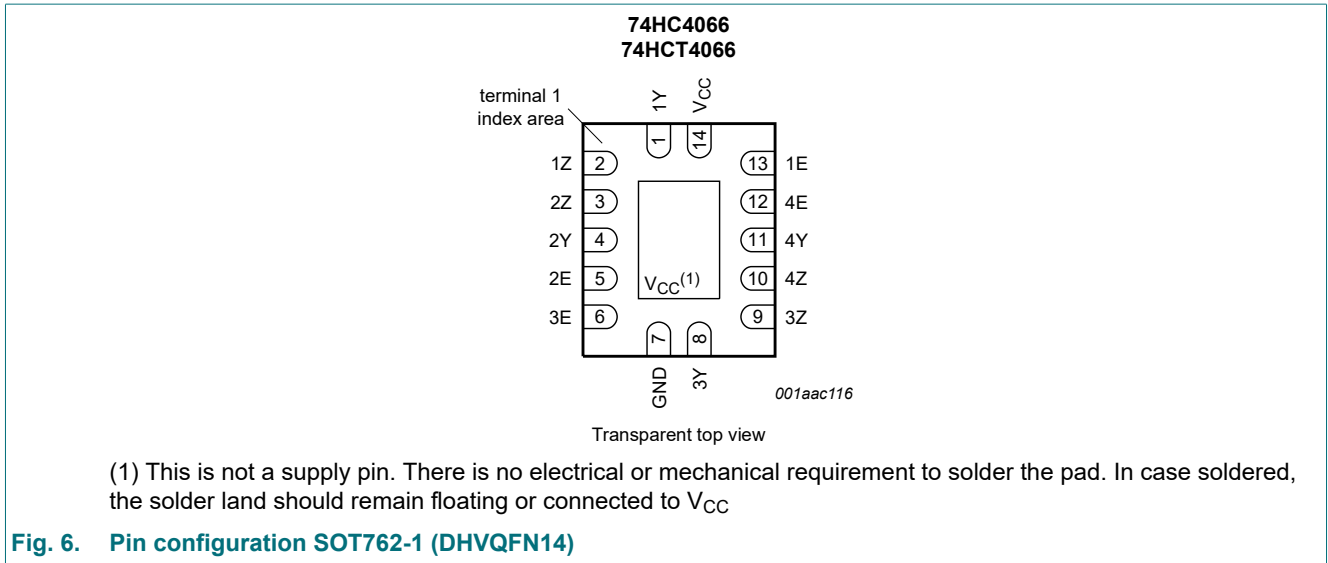


Fig. 5. Pin configuration and SOT402-1 (TSSOP14)



## 5.2. Pin description

Table 2. Pin description

| Symbol          | Pin          | Description                 |
|-----------------|--------------|-----------------------------|
| 1Z, 2Z, 3Z, 4Z  | 2, 3, 9, 10  | independent input or output |
| 1Y, 2Y, 3Y, 4Y  | 1, 4, 8, 11  | independent input or output |
| GND             | 7            | ground (0 V)                |
| 1E, 2E, 3E, 4E  | 13, 5, 6, 12 | enable input (active HIGH)  |
| 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 | +11.0    | V    |
| $I_{IK}$  | input clamping current  | $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$       | -    | $\pm 20$ | mA   |
| $I_{SK}$  | switch clamping current | $V_{SW} < -0.5\text{ V}$ or $V_{SW} > V_{CC} + 0.5\text{ V}$ | -    | $\pm 20$ | mA   |
| $I_{SW}$  | switch current          | $V_{SW} = -0.5\text{ V}$ to $V_{CC} + 0.5\text{ V}$ [1]      | -    | $\pm 25$ | mA   |
| $I_{CC}$  | supply current          |  | -    | 50       | mA   |
| $I_{GND}$ | ground current          |  | -    | -50      | mA   |
| $T_{stg}$ | storage temperature     |  | -65  | +150     | °C   |
| $P_{tot}$ | total power dissipation | $T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$ [2]            | -    | 500      | mW   |
| $P$       | power dissipation       | per switch   | -    | 100      | mW   |

- [1] To avoid drawing  $V_{CC}$  current out of terminal Z, when switch current flows in terminals Yn, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal Z, no  $V_{CC}$  current will flow out of terminals Yn. In this case there is no limit for the voltage drop across the switch, but the voltages at Yn and Z may not exceed  $V_{CC}$  or GND.
- [2] 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               | 74HC4066 |      |          | 74HCT4066 |      |          | Unit |
|---------------------|-------------------------------------|--------------------------|----------|------|----------|-----------|------|----------|------|
|                     |                                     |                          | Min      | Typ  | Max      | Min       | Typ  | Max      |      |
| $V_{CC}$            | supply voltage                      |                          | 2.0      | 5.0  | 10.0     | 4.5       | 5.0  | 5.5      | V    |
| $V_I$               | input voltage                       |                          | GND      | -    | $V_{CC}$ | GND       | -    | $V_{CC}$ | V    |
| $V_{SW}$            | switch voltage                      |                          | GND      | -    | $V_{CC}$ | GND       | -    | $V_{CC}$ | V    |
| $T_{amb}$           | ambient temperature                 |                          | -40      | +25  | +125     | -40       | +25  | +125     | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 2.0\text{ V}$  | -        | -    | 625      | -         | -    | -        | ns/V |
|                     |                                     | $V_{CC} = 4.5\text{ V}$  | -        | 1.67 | 139      | -         | 1.67 | 139      | ns/V |
|                     |                                     | $V_{CC} = 6.0\text{ V}$  | -        | -    | 83       | -         | -    | -        | ns/V |
|                     |                                     | $V_{CC} = 10.0\text{ V}$ | -        | -    | 35       | -         | -    | -        | ns/V |

## 9. Static characteristics

**Table 6.  $R_{ON}$  resistance per switch for types 74HC4066 and 74HCT4066**

$V_I = V_{IH}$  or  $V_{IL}$ ; for test circuit see Fig. 7.

$V_{is}$  is the input voltage at a Yn or Z terminal, whichever is assigned as an input.

$V_{os}$  is the output voltage at a Yn or Z terminal, whichever is assigned as an output.

For 74HC4066:  $V_{CC} - GND = 2.0\text{ V}, 4.5\text{ V}, 6.0\text{ V}$  and  $9.0\text{ V}$ .

For 74HCT4066:  $V_{CC} - GND = 4.5\text{ V}$ .

| Symbol          | Parameter                               | Conditions   | -40 °C to +85 °C |        |     | -40 °C to +125 °C |     | Unit     |
|-----------------|---|--|------------------|--------|-----|-------------------|-----|----------|
|                 |   |  | Min              | Typ[1] | Max | Min               | Max |          |
| $R_{ON(peak)}$  | ON resistance (peak)                    | $V_{is} = V_{CC}$ to GND                               |                  |        |     |                   |     |          |
|                 |   | $V_{CC} = 2.0\text{ V}; I_{SW} = 100\ \mu\text{A}$ [2] | -                | -      | -   | -                 | -   | $\Omega$ |
|                 |   | $V_{CC} = 4.5\text{ V}; I_{SW} = 1000\ \mu\text{A}$    | -                | 54     | -   | 118               | 142 | $\Omega$ |
|                 |   | $V_{CC} = 6.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$    | -                | 42     | -   | 105               | 126 | $\Omega$ |
|                 |   | $V_{CC} = 9.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$    | -                | 32     | -   | 88                | 105 | $\Omega$ |
| $R_{ON(rail)}$  | ON resistance (rail)                    | $V_{is} = GND$   |                  |        |     |                   |     |          |
|                 |   | $V_{CC} = 2.0\text{ V}; I_{SW} = 100\ \mu\text{A}$ [2] | -                | 80     | -   | -                 | -   | $\Omega$ |
|                 |   | $V_{CC} = 4.5\text{ V}; I_{SW} = 1000\ \mu\text{A}$    | -                | 35     | -   | 95                | 115 | $\Omega$ |
|                 |   | $V_{CC} = 6.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$    | -                | 27     | -   | 82                | 100 | $\Omega$ |
|                 |   | $V_{CC} = 9.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$    | -                | 20     | -   | 70                | 85  | $\Omega$ |
|                 |   | $V_{is} = V_{CC}$                                      |                  |        |     |                   |     |          |
|                 |   | $V_{CC} = 2.0\text{ V}; I_{SW} = 100\ \mu\text{A}$ [2] | -                | 100    | -   | -                 | -   | $\Omega$ |
|                 |   | $V_{CC} = 4.5\text{ V}; I_{SW} = 1000\ \mu\text{A}$    | -                | 42     | -   | 106               | 128 | $\Omega$ |
|                 |   | $V_{CC} = 6.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$    | -                | 35     | -   | 94                | 113 | $\Omega$ |
|                 |   | $V_{CC} = 9.0\text{ V}; I_{SW} = 1000\ \mu\text{A}$    | -                | 20     | -   | 78                | 95  | $\Omega$ |
| $\Delta R_{ON}$ | ON resistance mismatch between channels | $V_{is} = V_{CC}$ to GND                               |                  |        |     |                   |     |          |
|                 |   | $V_{CC} = 2.0\text{ V}$ [2]                            | -                | -      | -   | -                 | -   | $\Omega$ |
|                 |   | $V_{CC} = 4.5\text{ V}$                                | -                | 5      | -   | -                 | -   | $\Omega$ |
|                 |   | $V_{CC} = 6.0\text{ V}$                                | -                | 4      | -   | -                 | -   | $\Omega$ |
|                 |   | $V_{CC} = 9.0\text{ V}$                                | -                | 3      | -   | -                 | -   | $\Omega$ |

[1] Typical values are measured at  $T_{amb} = 25\text{ °C}$ .

[2] At supply voltages ( $V_{CC} - GND$ ) approaching 2 V, the analog switch ON resistance becomes extremely non-linear. Therefore it is recommended that these devices be used to transmit digital signals only, when using these supply voltages.

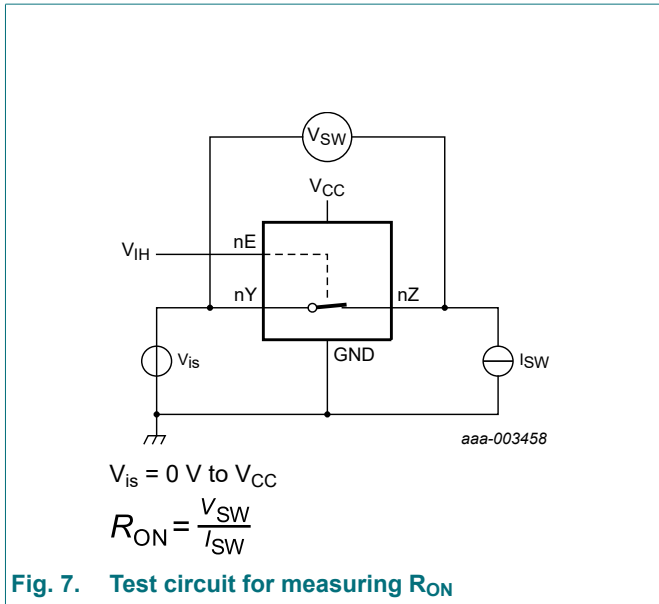


Fig. 7. Test circuit for measuring  $R_{ON}$

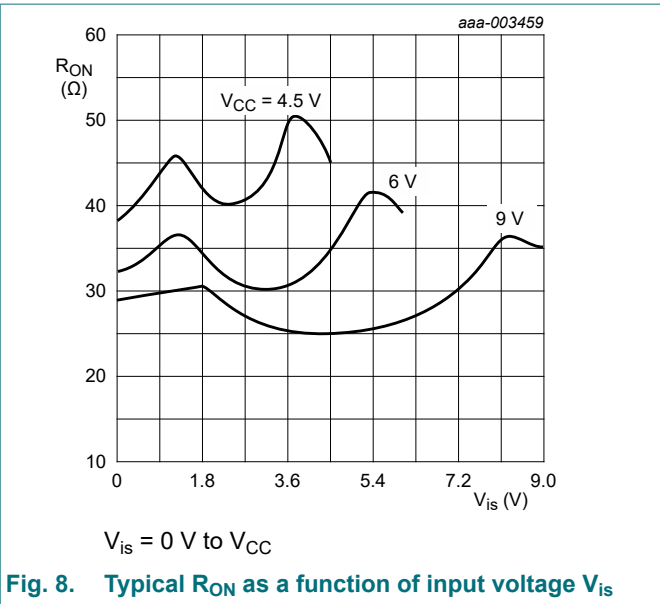


Fig. 8. Typical  $R_{ON}$  as a function of input voltage  $V_{is}$

Table 7. Static characteristics 74HC4066

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

$V_{is}$  is the input voltage at a Yn or Z terminal, whichever is assigned as an input.

$V_{os}$  is the output voltage at a Yn or Z terminal, whichever is assigned as an output.

| Symbol   | Parameter                 | Conditions   | Min  | Typ[1] | Max       | Unit          |
|--|---------------------------|--|------|--------|-----------|---------------|
| <b><math>T_{amb} = -40\text{ °C to }+85\text{ °C}</math></b> |                           |  |      |        |           |               |
| $V_{IH}$   | HIGH-level input voltage  | $V_{CC} = 2.0\text{ V}$  | 1.5  | 1.2    | -         | V             |
|  |                           | $V_{CC} = 4.5\text{ V}$  | 3.15 | 2.4    | -         | V             |
|  |                           | $V_{CC} = 6.0\text{ V}$  | 4.2  | 3.2    | -         | V             |
|  |                           | $V_{CC} = 9.0\text{ V}$  | 6.3  | 4.7    | -         | V             |
| $V_{IL}$   | LOW-level input voltage   | $V_{CC} = 2.0\text{ V}$  | -    | 0.8    | 0.5       | V             |
|  |                           | $V_{CC} = 4.5\text{ V}$  | -    | 2.1    | 1.35      | V             |
|  |                           | $V_{CC} = 6.0\text{ V}$  | -    | 2.8    | 1.80      | V             |
|  |                           | $V_{CC} = 9.0\text{ V}$  | -    | 4.3    | 2.70      | V             |
| $I_I$  | input leakage current     | $V_I = V_{CC}$ or GND  |      |        |           |               |
|  |                           | $V_{CC} = 6.0\text{ V}$  | -    | -      | $\pm 1.0$ | $\mu\text{A}$ |
|  |                           | $V_{CC} = 10.0\text{ V}$   | -    | -      | $\pm 2.0$ | $\mu\text{A}$ |
| $I_{S(OFF)}$   | OFF-state leakage current | $V_{CC} = 10.0\text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - \text{GND}$ ; see Fig. 9  |      |        |           |               |
|  |                           | per channel  | -    | -      | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{S(ON)}$  | ON-state leakage current  | $V_{CC} = 10.0\text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - \text{GND}$ ; see Fig. 10 | -    | -      | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{CC}$   | supply current            | $V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or $V_{CC}$ ; $V_{os} = V_{CC}$ or GND                    |      |        |           |               |
|  |                           | $V_{CC} = 6.0\text{ V}$  | -    | -      | 20.0      | $\mu\text{A}$ |
|  |                           | $V_{CC} = 10.0\text{ V}$   | -    | -      | 40.0      | $\mu\text{A}$ |
| $C_I$  | input capacitance         |  | -    | 3.5    | -         | pF            |
| $C_{SW}$   | switch capacitance        |  | -    | 8      | -         | pF            |

| Symbol                                     | Parameter                 | Conditions   | Min  | Typ[1] | Max  | Unit |
|--|---------------------------|--|------|--------|------|------|
| <b>T<sub>amb</sub> = -40 °C to +125 °C</b> |                           |  |      |        |      |      |
| V <sub>IH</sub>                            | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V  | 1.5  | -      | -    | V    |
|  |                           | V <sub>CC</sub> = 4.5 V  | 3.15 | -      | -    | V    |
|  |                           | V <sub>CC</sub> = 6.0 V  | 4.2  | -      | -    | V    |
|  |                           | V <sub>CC</sub> = 9.0 V  | 6.3  | -      | -    | V    |
| V <sub>IL</sub>                            | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V  | -    | -      | 0.50 | V    |
|  |                           | V <sub>CC</sub> = 4.5 V  | -    | -      | 1.35 | V    |
|  |                           | V <sub>CC</sub> = 6.0 V  | -    | -      | 1.80 | V    |
|  |                           | V <sub>CC</sub> = 9.0 V  | -    | -      | 2.70 | V    |
| I <sub>I</sub>                             | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND  |      |        |      |      |
|  |                           | V <sub>CC</sub> = 6.0 V  | -    | -      | ±1.0 | µA   |
|  |                           | V <sub>CC</sub> = 10.0 V   | -    | -      | ±2.0 | µA   |
| I <sub>S(OFF)</sub>                        | OFF-state leakage current | V <sub>CC</sub> = 10.0 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;<br> V <sub>SW</sub>   = V <sub>CC</sub> - GND; see <a href="#">Fig. 9</a>  |      |        |      |      |
|  |                           | per channel  | -    | -      | ±1.0 | µA   |
| I <sub>S(ON)</sub>                         | ON-state leakage current  | V <sub>CC</sub> = 10.0 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;<br> V <sub>SW</sub>   = V <sub>CC</sub> - GND; see <a href="#">Fig. 10</a> | -    | -      | ±1.0 | µA   |
| I <sub>CC</sub>                            | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>is</sub> = GND or V <sub>CC</sub> ;<br>V <sub>os</sub> = V <sub>CC</sub> or GND                            |      |        |      |      |
|  |                           | V <sub>CC</sub> = 6.0 V  | -    | -      | 40   | µA   |
|  |                           | V <sub>CC</sub> = 10.0 V   | -    | -      | 80   | µA   |

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

**Table 8. Static characteristics 74HCT4066**

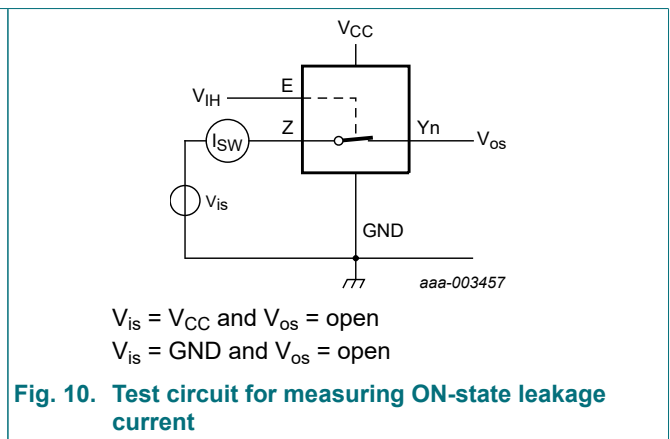
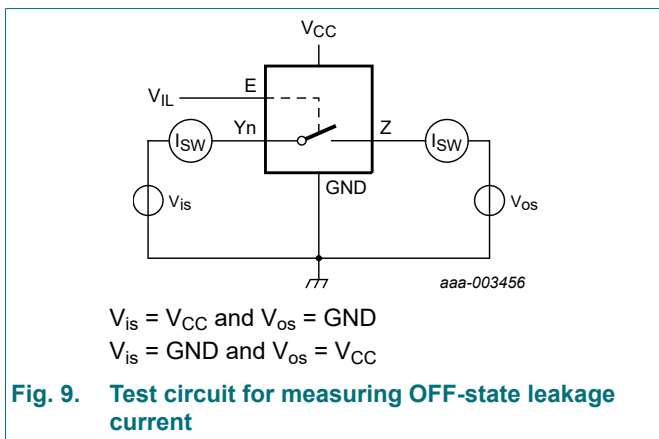
At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

$V_{is}$  is the input voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an input.

$V_{os}$  is the output voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an output.

| Symbol  | Parameter                 | Conditions  | Min | Typ[1] | Max       | Unit          |
|---|---------------------------|---|-----|--------|-----------|---------------|
| <b><math>T_{amb} = -40\text{ °C to }+85\text{ °C}</math></b>  |                           |   |     |        |           |               |
| $V_{IH}$  | HIGH-level input voltage  | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$   | 2.0 | 1.6    | -         | V             |
| $V_{IL}$  | LOW-level input voltage   | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$   | -   | 1.2    | 0.8       | V             |
| $I_I$   | input leakage current     | $V_I = V_{CC}$ or GND; $V_{CC} = 5.5\text{ V}$  | -   | -      | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{S(OFF)}$  | OFF-state leakage current | $V_{CC} = 5.5\text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ;<br>$ V_{SW}  = V_{CC} - \text{GND}$ ; see Fig. 9                         |     |        |           |               |
|   |                           | per channel   | -   | -      | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{S(ON)}$   | ON-state leakage current  | $V_{CC} = 5.5\text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ;<br>$ V_{SW}  = V_{CC} - \text{GND}$ ; see Fig. 10                        | -   | -      | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{CC}$  | supply current            | $V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or $V_{CC}$ ;<br>$V_{os} = V_{CC}$ or GND; $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ | -   | -      | 20.0      | $\mu\text{A}$ |
| $\Delta I_{CC}$   | additional supply current | per input pin; $V_I = V_{CC} - 2.1\text{ V}$ ; other inputs<br>at $V_{CC}$ or GND; $V_{CC} = 4.5\text{ V to }5.5\text{ V}$      | -   | 100    | 450       | $\mu\text{A}$ |
| $C_I$   | input capacitance         |   | -   | 3.5    | -         | pF            |
| $C_{SW}$  | switch capacitance        |   | -   | 8      | -         | pF            |
| <b><math>T_{amb} = -40\text{ °C to }+125\text{ °C}</math></b> |                           |   |     |        |           |               |
| $V_{IH}$  | HIGH-level input voltage  | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$   | 2.0 | -      | -         | V             |
| $V_{IL}$  | LOW-level input voltage   | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$   | -   | -      | 0.8       | V             |
| $I_I$   | input leakage current     | $V_I = V_{CC}$ or GND; $V_{CC} = 5.5\text{ V}$  | -   | -      | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{S(OFF)}$  | OFF-state leakage current | $V_{CC} = 5.5\text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ;<br>$ V_{SW}  = V_{CC} - \text{GND}$ ; see Fig. 9                         |     |        |           |               |
|   |                           | per channel   | -   | -      | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{S(ON)}$   | ON-state leakage current  | $V_{CC} = 5.5\text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ;<br>$ V_{SW}  = V_{CC} - \text{GND}$ ; see Fig. 10                        | -   | -      | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{CC}$  | supply current            | $V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or $V_{CC}$ ;<br>$V_{os} = V_{CC}$ or GND; $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ | -   | -      | 40        | $\mu\text{A}$ |
| $\Delta I_{CC}$   | additional supply current | per input pin; $V_I = V_{CC} - 2.1\text{ V}$ ; other inputs<br>at $V_{CC}$ or GND; $V_{CC} = 4.5\text{ V to }5.5\text{ V}$      | -   | -      | 490       | $\mu\text{A}$ |

[1] Typical values are measured at  $T_{amb} = 25\text{ °C}$ .





## 10. Dynamic characteristics

**Table 9. Dynamic characteristics 74HC4066**

$GND = 0\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$  unless specified otherwise; for test circuit see [Fig. 13](#).

$V_{is}$  is the input voltage at a Yn or Z terminal, whichever is assigned as an input.

$V_{os}$  is the output voltage at a Yn or Z terminal, whichever is assigned as an output.

| Symbol    | Parameter                     | Conditions   | -40 °C to +85 °C |        |     | -40 °C to +125 °C |     | Unit |
|-----------|-------------------------------|--|------------------|--------|-----|-------------------|-----|------|
|           |                               |  | Min              | Typ[1] | Max | Min               | Max |      |
| $t_{pd}$  | propagation delay             | nY to nZ or nZ to nY; $R_L = \infty\ \Omega$ ; see <a href="#">Fig. 11</a> [2] |                  |        |     |                   |     |      |
|           |                               | $V_{CC} = 2.0\text{ V}$  | -                | 8      | 75  | -                 | 90  | ns   |
|           |                               | $V_{CC} = 4.5\text{ V}$  | -                | 3      | 15  | -                 | 18  | ns   |
|           |                               | $V_{CC} = 6.0\text{ V}$  | -                | 2      | 13  | -                 | 15  | ns   |
|           |                               | $V_{CC} = 9.0\text{ V}$  | -                | 2      | 10  | -                 | 12  | ns   |
| $t_{off}$ | turn-off time                 | nE to nY or nZ; see <a href="#">Fig. 12</a> [3]                                |                  |        |     |                   |     |      |
|           |                               | $V_{CC} = 2.0\text{ V}$  | -                | 44     | 190 | -                 | 225 | ns   |
|           |                               | $V_{CC} = 4.5\text{ V}$  | -                | 16     | 38  | -                 | 45  | ns   |
|           |                               | $V_{CC} = 5.0\text{ V}$ ; $C_L = 15\text{ pF}$                                 | -                | 13     | -   | -                 | -   | ns   |
|           |                               | $V_{CC} = 6.0\text{ V}$  | -                | 13     | 33  | -                 | 38  | ns   |
|           |                               | $V_{CC} = 9.0\text{ V}$  | -                | 16     | 26  | -                 | 30  | ns   |
| $t_{on}$  | turn-on time                  | nE to nY or nZ; see <a href="#">Fig. 12</a> [4]                                |                  |        |     |                   |     |      |
|           |                               | $V_{CC} = 2.0\text{ V}$  | -                | 36     | 125 | -                 | 150 | ns   |
|           |                               | $V_{CC} = 4.5\text{ V}$  | -                | 13     | 25  | -                 | 30  | ns   |
|           |                               | $V_{CC} = 5.0\text{ V}$ ; $C_L = 15\text{ pF}$                                 | -                | 11     | -   | -                 | -   | ns   |
|           |                               | $V_{CC} = 6.0\text{ V}$  | -                | 10     | 21  | -                 | 26  | ns   |
|           |                               | $V_{CC} = 9.0\text{ V}$  | -                | 8      | 16  | -                 | 20  | ns   |
| $C_{PD}$  | power dissipation capacitance | per switch; $V_I = GND$ to $V_{CC}$ [5]  | -                | 11     | -   | -                 | -   | pF   |

[1] Typical values are measured at  $T_{amb} = 25\text{ °C}$ .

[2]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ .

[3]  $t_{off}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .

[4]  $t_{on}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .

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

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

$\sum\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$  = sum of outputs;

$C_L$  = output load capacitance in pF;

$C_{sw}$  = switch capacitance in pF;

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

**Table 10. Dynamic characteristics 74HCT4066**

$GND = 0\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$  unless specified otherwise; for test circuit see Fig. 13.

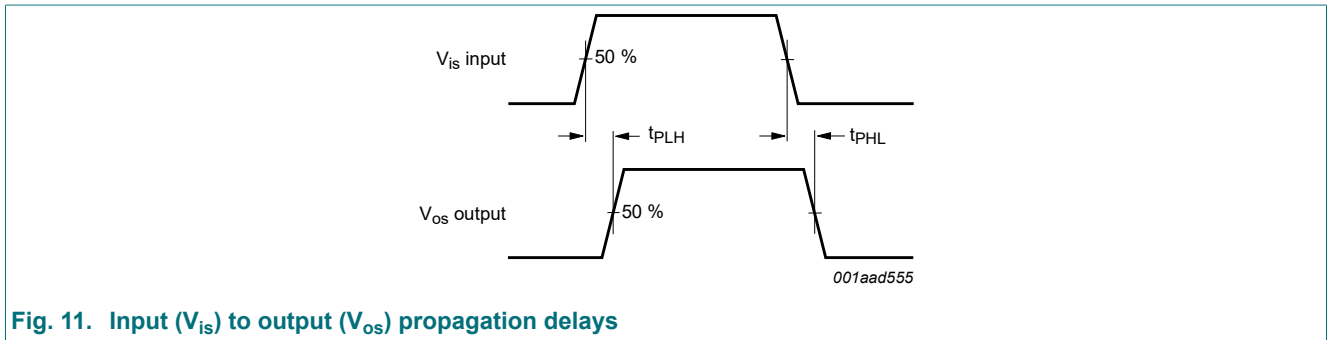
$V_{is}$  is the input voltage at a Yn or Z terminal, whichever is assigned as an input.

$V_{os}$  is the output voltage at a Yn or Z terminal, whichever is assigned as an output.

| Symbol    | Parameter                     | Conditions   | -40 °C to +85 °C |        |     | -40 °C to +125 °C |     | Unit |
|-----------|-------------------------------|--|------------------|--------|-----|-------------------|-----|------|
|           |                               |  | Min              | Typ[1] | Max | Min               | Max |      |
| $t_{pd}$  | propagation delay             | nY to nZ or nZ to nY; $R_L = \infty\ \Omega$ ; see Fig. 11 [2] |                  |        |     |                   |     |      |
|           |                               | $V_{CC} = 4.5\text{ V}$  | -                | 3      | 15  | -                 | 18  | ns   |
| $t_{off}$ | turn-off time                 | nE to nY or nZ; see Fig. 12 [3]                                |                  |        |     |                   |     |      |
|           |                               | $V_{CC} = 4.5\text{ V}$  | -                | 20     | 44  | -                 | 53  | ns   |
|           |                               | $V_{CC} = 5.0\text{ V}$ ; $C_L = 15\text{ pF}$                 | -                | 16     | -   | -                 | -   | ns   |
| $t_{on}$  | turn-on time                  | nE to nY or nZ; see Fig. 12 [4]                                |                  |        |     |                   |     |      |
|           |                               | $V_{CC} = 4.5\text{ V}$  | -                | 12     | 30  | -                 | 36  | ns   |
|           |                               | $V_{CC} = 5.0\text{ V}$ ; $C_L = 15\text{ pF}$                 | -                | 12     | -   | -                 | -   | ns   |
| $C_{PD}$  | power dissipation capacitance | per switch; $V_I = GND$ to $(V_{CC} - 1.5\text{ V})$ [5]       | -                | 12     | -   | -                 | -   | pF   |

- [1] Typical values are measured at  $T_{amb} = 25\text{ °C}$ .
- [2]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ .
- [3]  $t_{off}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .
- [4]  $t_{on}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .
- [5]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$  where:  
 $f_i$  = input frequency in MHz;  
 $f_o$  = output frequency in MHz;  
 $\sum\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$  = sum of outputs;  
 $C_L$  = output load capacitance in pF;  
 $C_{sw}$  = switch capacitance in pF;  
 $V_{CC}$  = supply voltage in V.

**10.1. Waveforms and test circuit**



**Fig. 11. Input ( $V_{is}$ ) to output ( $V_{os}$ ) propagation delays**

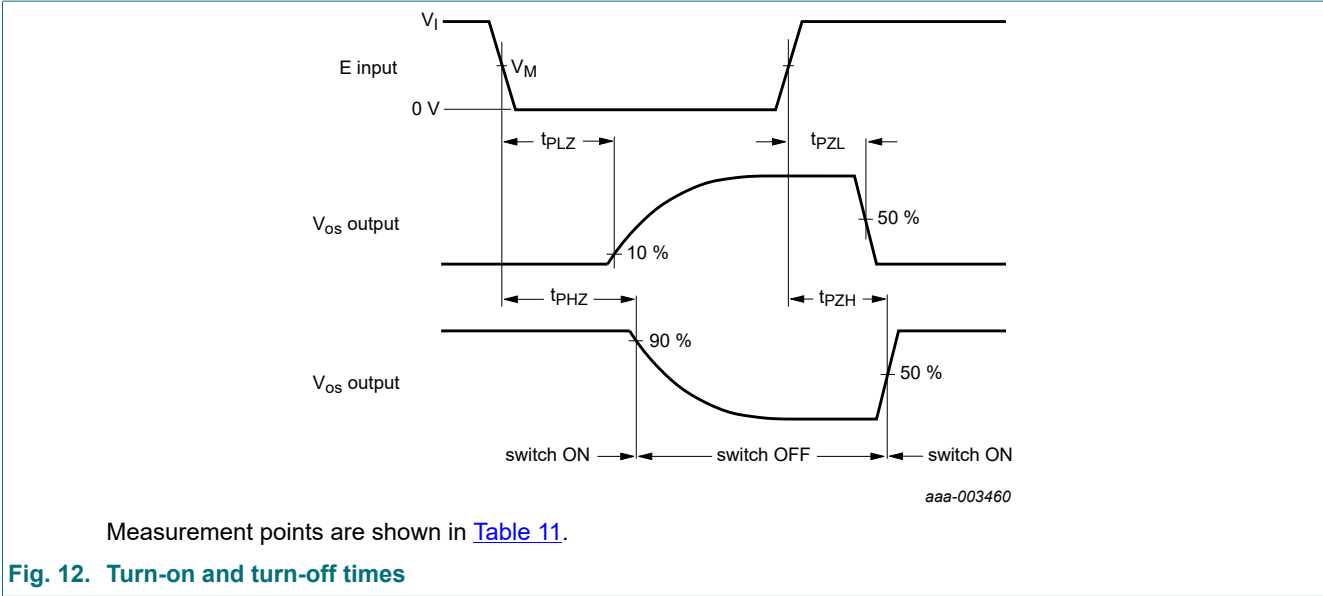


Table 11. Measurement points

| Type      | V <sub>I</sub>  | V <sub>M</sub>     |
|-----------|-----------------|--------------------|
| 74HC4066  | V <sub>CC</sub> | 0.5V <sub>CC</sub> |
| 74HCT4066 | 3.0 V           | 1.3 V              |

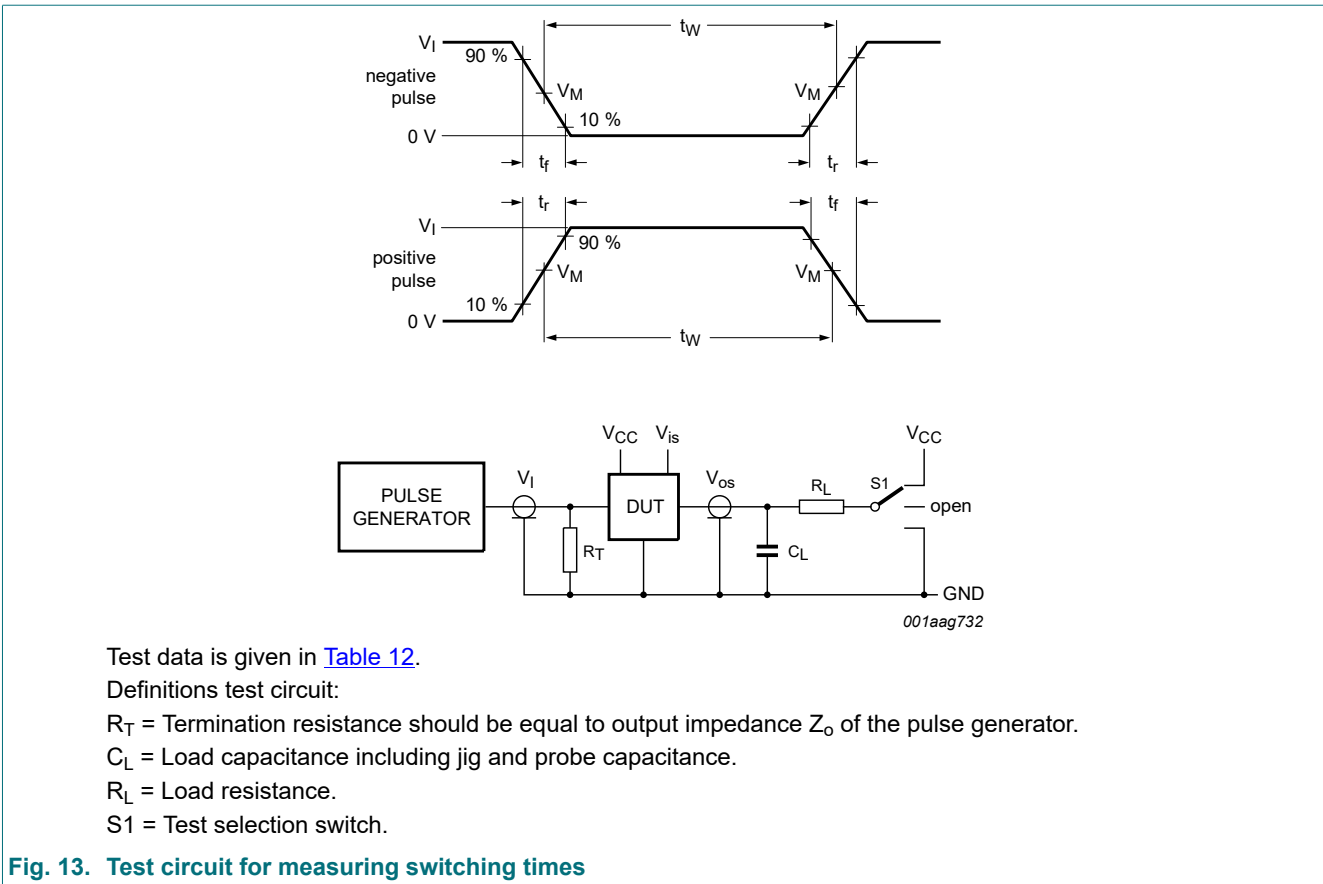


Table 12. Test data

| Test               | Input           |                 |            | Output        |              | S1 position |
|--------------------|-----------------|-----------------|------------|---------------|--------------|-------------|
|                    | Control E       | Switch Yn (Z)   | $t_r, t_f$ | Switch Z (Yn) |              |             |
|                    | $V_I$ [1]       | $V_{is}$        |            | $C_L$         | $R_L$        |             |
| $t_{PHL}, t_{PLH}$ | GND             | GND to $V_{CC}$ | 6 ns       | 50 pF         | -            | open        |
| $t_{PHZ}, t_{PZH}$ | GND to $V_{CC}$ | $V_{CC}$        | 6 ns       | 50 pF, 15 pF  | 1 k $\Omega$ | GND         |
| $t_{PLZ}, t_{PZL}$ | GND to $V_{CC}$ | GND             | 6 ns       | 50 pF, 15 pF  | 1 k $\Omega$ | $V_{CC}$    |

[1] For 74HCT4066: maximum input voltage  $V_I = 3.0$  V.

## 11. Additional dynamic characteristics

Table 13. Additional dynamic characteristics

Recommended conditions and typical values; GND = 0 V;  $T_{amb} = 25$  °C.

$V_{is}$  is the input voltage at a Yn or Z terminal, whichever is assigned as an input.

$V_{os}$  is the output voltage at a Yn or Z terminal, whichever is assigned as an output.

| Symbol         | Parameter                 | Conditions  | Min | Typ  | Max | Unit |
|----------------|---------------------------|---|-----|------|-----|------|
| THD            | total harmonic distortion | $f_i = 1$ kHz; $R_L = 10$ k $\Omega$ ; $C_L = 50$ pF; see Fig. 14   |     |      |     | %    |
|                |                           | $V_{CC} = 4.5$ V; $V_I = 4.0$ V (p-p)   | -   | 0.04 | -   | %    |
|                |                           | $V_{CC} = 9.0$ V; $V_I = 8.0$ V (p-p)   | -   | 0.02 | -   | %    |
|                |                           | $f_i = 10$ kHz; $R_L = 10$ k $\Omega$ ; $C_L = 50$ pF; see Fig. 14  |     |      |     |      |
|                |                           | $V_{CC} = 4.5$ V; $V_I = 4.0$ V (p-p)   | -   | 0.12 | -   | %    |
|                |                           | $V_{CC} = 9.0$ V; $V_I = 8.0$ V (p-p)   | -   | 0.06 | -   | %    |
| $f_{(-3dB)}$   | -3 dB frequency response  | $R_L = 50$ $\Omega$ ; $C_L = 10$ pF; see Fig. 15 [1]  |     |      |     |      |
|                |                           | $V_{CC} = 4.5$ V  | -   | 180  | -   | MHz  |
|                |                           | $V_{CC} = 9.0$ V  | -   | 200  | -   | MHz  |
| $\alpha_{iso}$ | isolation (OFF-state)     | $R_L = 600$ $\Omega$ ; $C_L = 50$ pF; $f_i = 1$ MHz; see Fig. 16 [2]  |     |      |     |      |
|                |                           | $V_{CC} = 4.5$ V  | -   | -50  | -   | dB   |
|                |                           | $V_{CC} = 9.0$ V  | -   | -50  | -   | dB   |
| $V_{ct}$       | crosstalk voltage         | between digital input and switch (peak to peak value); $R_L = 600$ $\Omega$ ; $C_L = 50$ pF; $f_i = 1$ MHz; see Fig. 17 |     |      |     |      |
|                |                           | $V_{CC} = 4.5$ V  | -   | 110  | -   | mV   |
|                |                           | $V_{CC} = 9.0$ V  | -   | 220  | -   | mV   |
| Xtalk          | crosstalk                 | between switches; $R_L = 600$ $\Omega$ ; $C_L = 50$ pF; $f_i = 1$ MHz; see Fig. 18 [2]                                  |     |      |     |      |
|                |                           | $V_{CC} = 4.5$ V  | -   | -60  | -   | dB   |
|                |                           | $V_{CC} = 9.0$ V  | -   | -60  | -   | dB   |

[1] Adjust input voltage  $V_{is}$  to 0 dBm level at  $V_{os}$  for  $f_i = 1$  MHz (0 dBm = 1 mW into 50  $\Omega$ ). After set-up,  $f_i$  is increased to obtain a reading of -3 dB at  $V_{os}$ .

[2] Adjust input voltage  $V_{is}$  to 0 dBm level (0 dBm = 1 mW into 600  $\Omega$ ).

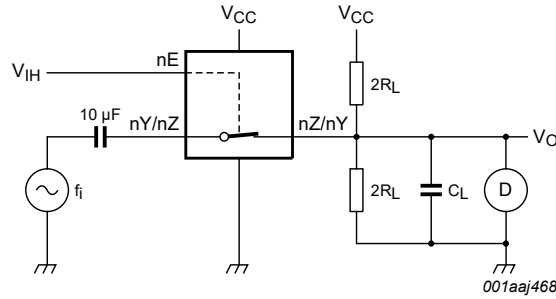
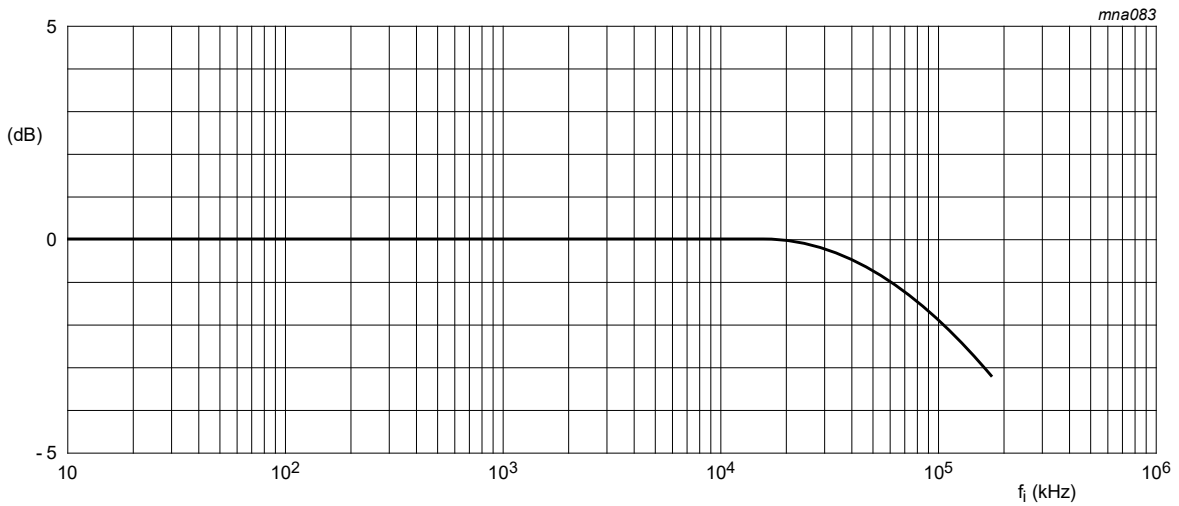
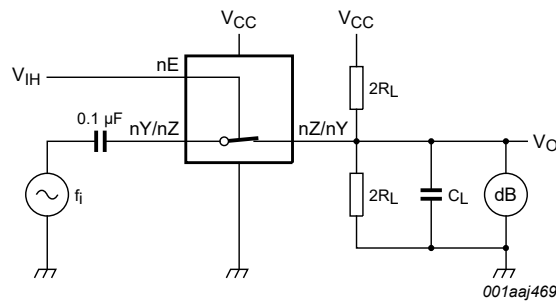


Fig. 14. Test circuit for measuring total harmonic distortion



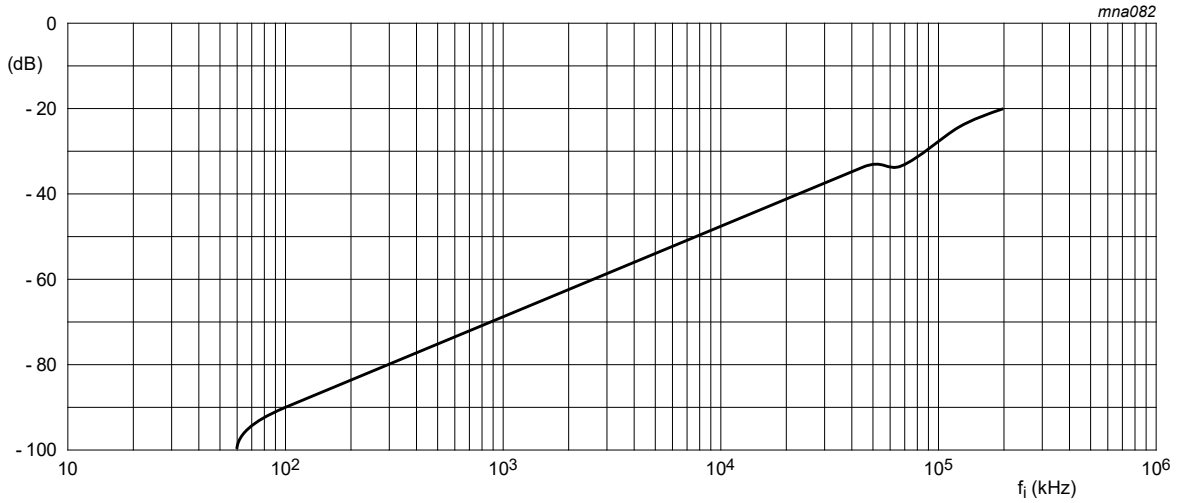
a. Typical -3 dB frequency response



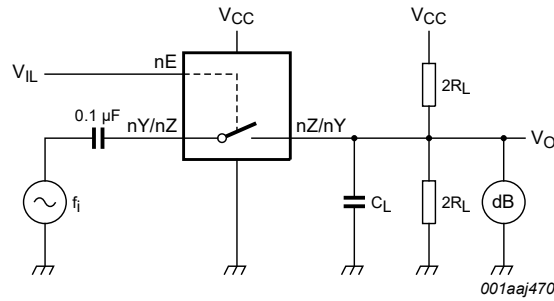
b. Test circuit

$V_{CC} = 4.5 \text{ V}$ ;  $GND = 0 \text{ V}$ ;  $R_L = 50 \text{ }\Omega$ ;  $R_{source} = 1 \text{ k}\Omega$ .

Fig. 15. -3 dB frequency response as a function of frequency



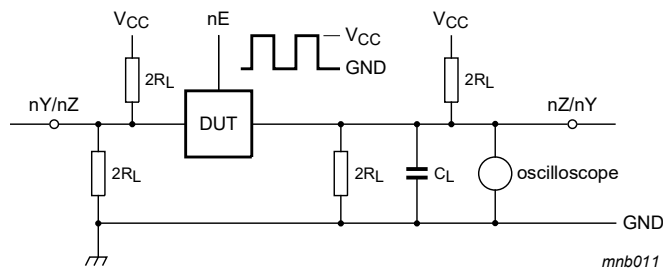
a. Isolation (OFF-state)



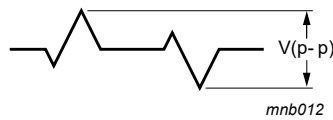
b. Test circuit

$V_{CC} = 4.5\text{ V}$ ;  $GND = 0\text{ V}$ ;  $R_L = 600\ \Omega$ ;  $R_{source} = 1\text{ k}\Omega$ .

**Fig. 16. Isolation (OFF-state) as a function of frequency**



a. Test circuit



b. Crosstalk voltage

**Fig. 17. Test circuit for measuring crosstalk voltage (between the digital input and the switch)**

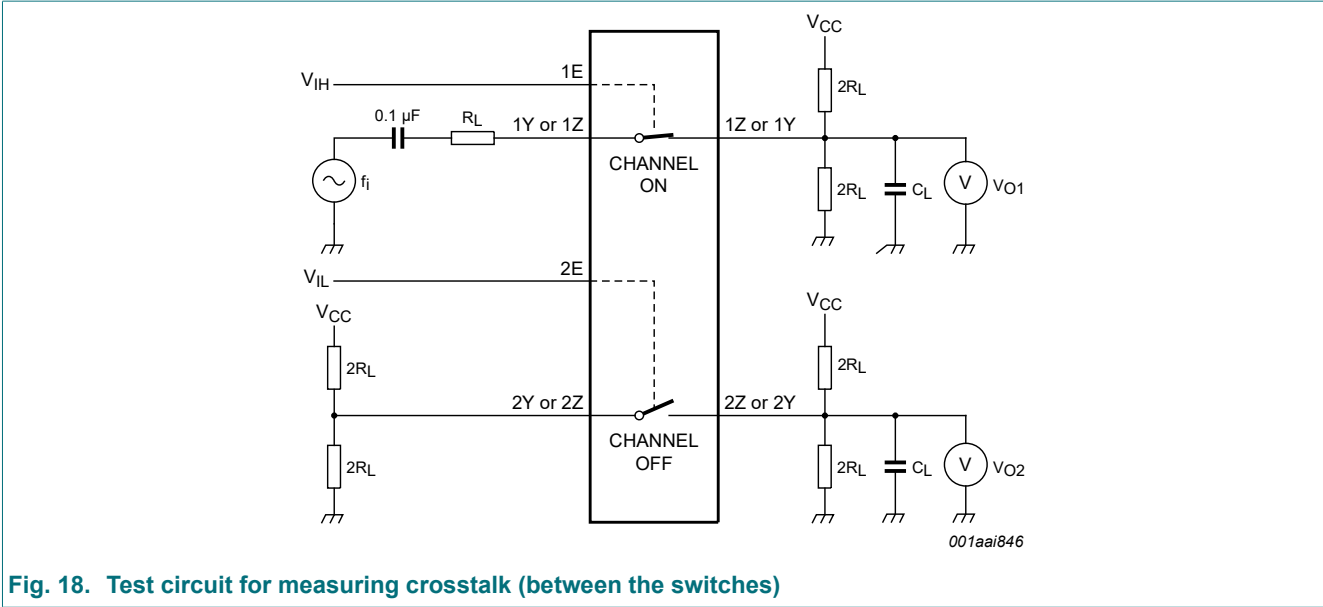


Fig. 18. Test circuit for measuring crosstalk (between the switches)

12. Package outline

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

SOT108-1

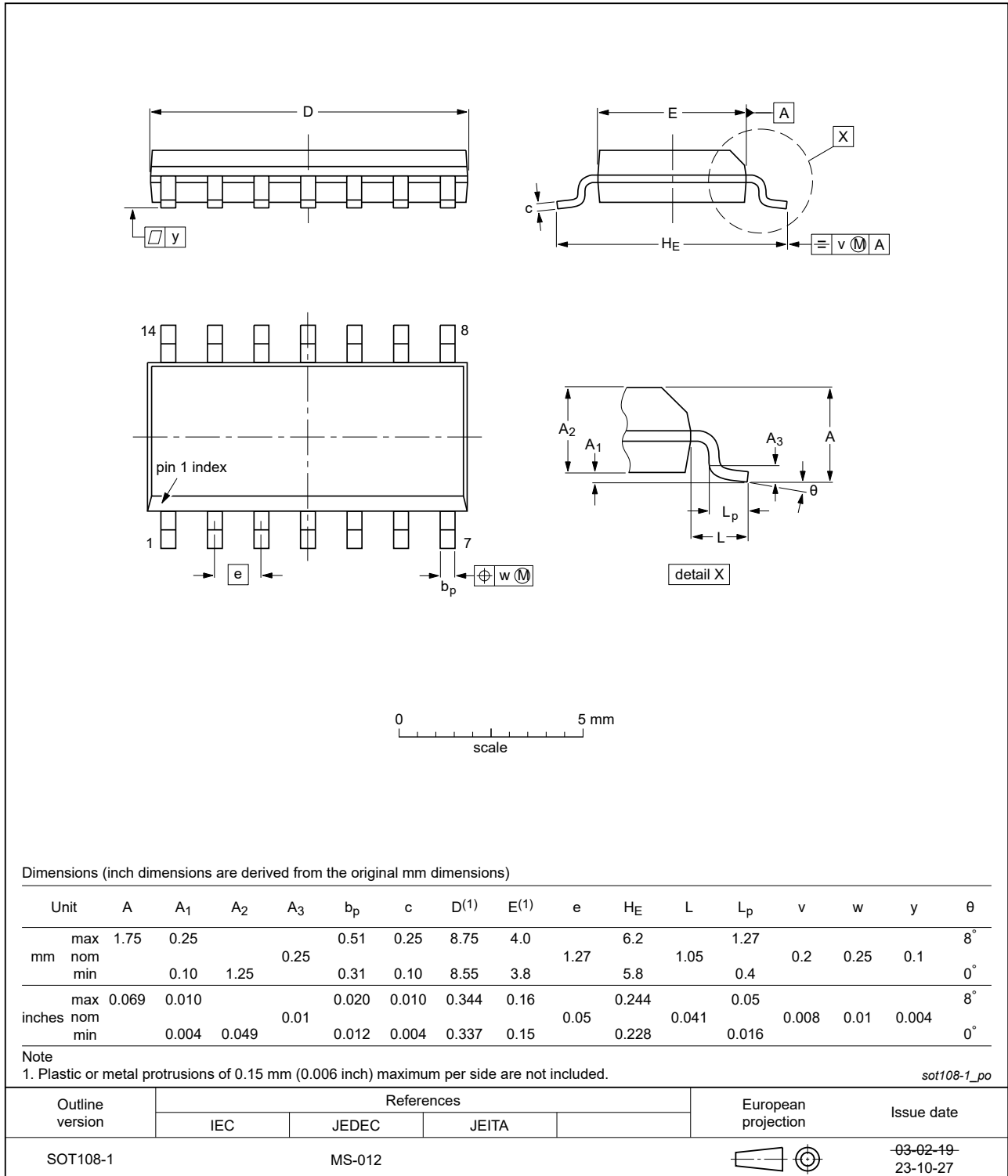


Fig. 19. Package outline SOT108-1 (SO14)



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

SOT402-1

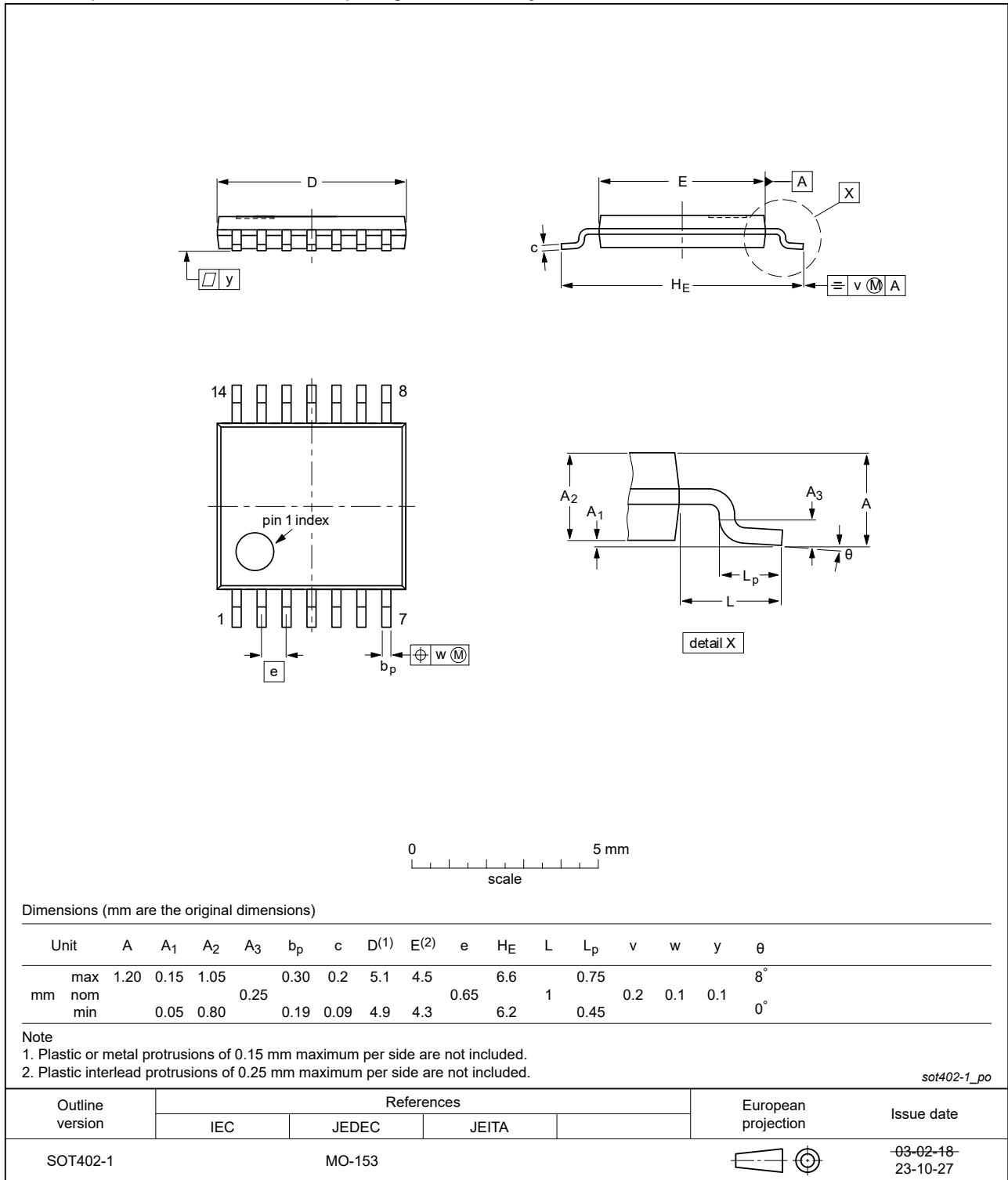


Fig. 20. Package outline SOT402-1 (TSSOP14)

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

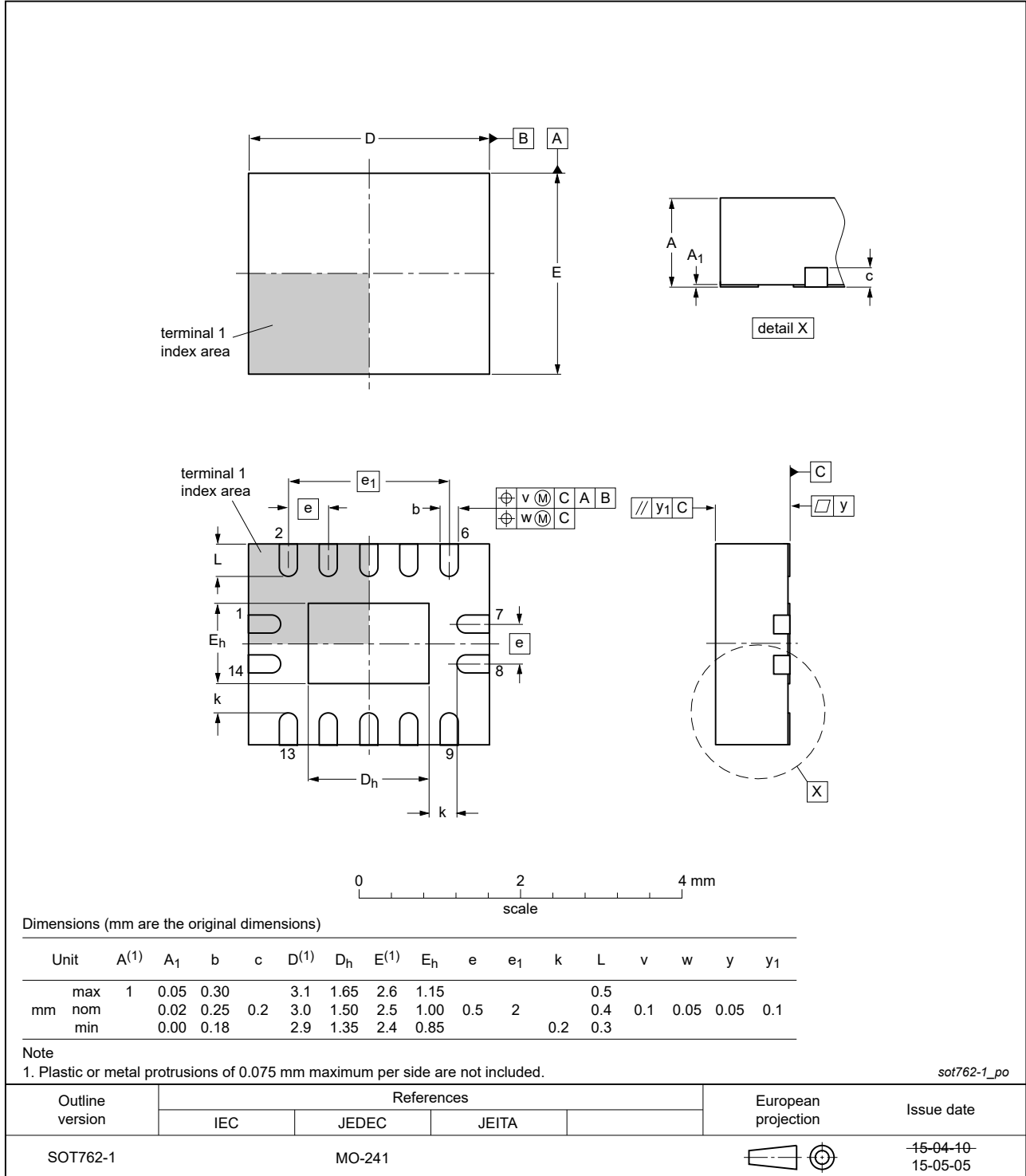


Fig. 21. Package outline SOT762-1 (DHVQFN14)

## 13. Abbreviations

Table 14. Abbreviations

| Acronym | Description                             |
|---------|---|
| CDM     | Charged 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 15. Revision history

| Document ID          | Release date   | Data sheet status     | Change notice | Supersedes           |
|----------------------|--|-----------------------|---------------|----------------------|
| 74HC_HCT4066 v.11    | 20240321   | Product data sheet    | -             | 74HC_HCT4066 v.10    |
| Modifications:       | <ul style="list-style-type: none"> <li>• <a href="#">Fig. 19</a>, <a href="#">Fig. 20</a>: Aligned SO and TSSOP package outline drawings to JEDEC MS-012 and MO-153.</li> <li>• <a href="#">Section 2</a>: ESD specification updated according to the latest JEDEC standard.</li> </ul>  |                       |               |                      |
| 74HC_HCT4066 v.10    | 20210608   | Product data sheet    | -             | 74HC_HCT4066 v.9     |
| Modifications:       | <ul style="list-style-type: none"> <li>• Type numbers 74HC4066DB and 74HCT4066DB (SOT337-1 / SSOP14) removed.</li> </ul>   |                       |               |                      |
| 74HC_HCT4066 v.9     | 20200414   | Product data sheet    | -             | 74HC_HCT4066 v.8     |
| 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="#">Table 9</a>: <math>C_{PD}</math> value of 74HC4066 moved to typical column.</li> <li>• <a href="#">Table 4</a>: Derating values for <math>P_{tot}</math> total power dissipation have been updated.</li> </ul> |                       |               |                      |
| 74HC_HCT4066 v.8     | 20151203   | Product data sheet    | -             | 74HC_HCT4066 v.7     |
| Modifications:       | <ul style="list-style-type: none"> <li>• Type numbers 74HC4066N and 74HCT4066N (SOT27-1) removed.</li> </ul>   |                       |               |                      |
| 74HC_HCT4066 v.7     | 20130402   | Product data sheet    | -             | 74HC_HCT4066 v.6     |
| Modifications:       | <ul style="list-style-type: none"> <li>• Descriptive title corrected (errata).</li> <li>• New general description (errata).</li> </ul>   |                       |               |                      |
| 74HC_HCT4066 v.6     | 20120718   | Product data sheet    | -             | 74HC_HCT4066 v.5     |
| Modifications:       | <ul style="list-style-type: none"> <li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>• Legal texts have been adapted to the new company name where appropriate.</li> </ul>  |                       |               |                      |
| 74HC_HCT4066 v.5     | 20041111   | Product data sheet    | -             | 74HC_HCT4066 v.4     |
| 74HC_HCT4066 v.4     | 20030617   | Product data sheet    | -             | 74HC_HCT4066_CNV v.3 |
| 74HC_HCT4067_CNV v.3 | 19981110   | Product data sheet    | -             | 74HC_HCT4066_CNV v.2 |
| 74HC_HCT4066_CNV v.2 | 19981002   | Product specification | -             | -                    |

## 15. 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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Date of release: 21 March 2024