

74HC4066-Q100; 74HCT4066-Q100

Quad single-pole single-throw analog switch

Rev. 4 — 14 April 2020

Product data sheet

1. General description

The 74HC4066-Q100; 74HCT4066-Q100 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} .

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
- Input levels nE inputs:
 - For 74HC4066-Q100: CMOS level
 - For 74HCT4066-Q100: TTL level
- Low ON resistance:
 - 50 Ω (typical) at $V_{CC} = 4.5$ V
 - 45 Ω (typical) at $V_{CC} = 6.0$ V
 - 35 Ω (typical) at $V_{CC} = 9.0$ V
- Specified in compliance with JEDEC standard no. 7A
- 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 Ω)
- 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 | | | |
|------------------|-------------------|----------|--|----------|
| | Temperature range | Name | Description | Version |
| 74HC4066D-Q100 | -40 °C to +125 °C | SO14 | plastic small outline package; 14 leads; body width 3.9 mm | SOT108-1 |
| 74HCT4066D-Q100 | | | | |
| 74HC4066PW-Q100 | -40 °C to +125 °C | TSSOP14 | plastic thin shrink small outline package; 14 leads; body width 4.4 mm | SOT402-1 |
| 74HCT4066PW-Q100 | | | | |
| 74HC4066BQ-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 |
| 74HCT4066BQ-Q100 | | | | |

4. Functional diagram

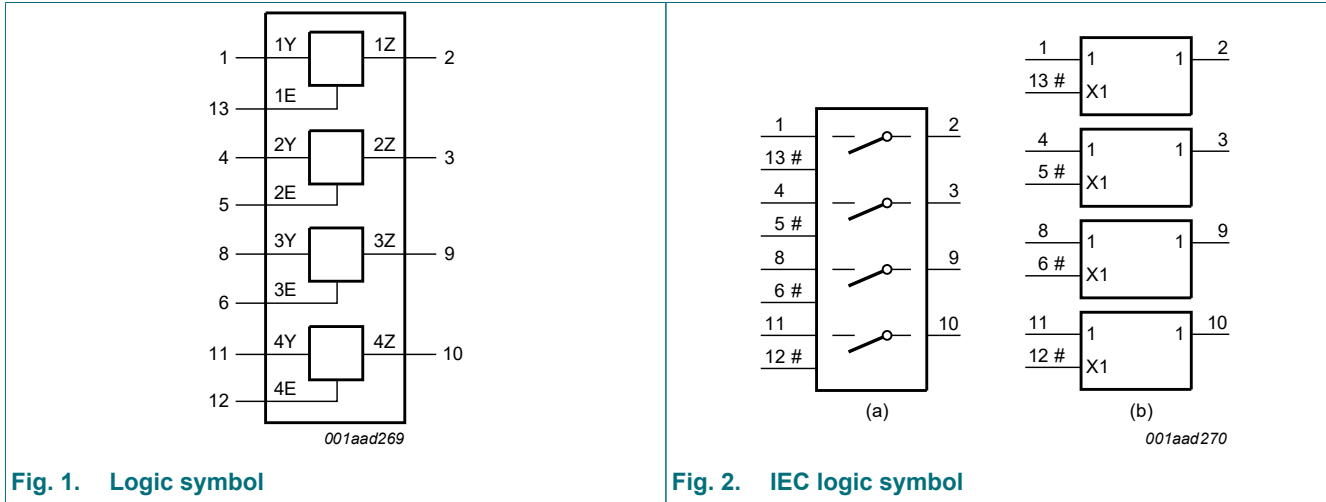


Fig. 1. Logic symbol

Fig. 2. IEC logic symbol

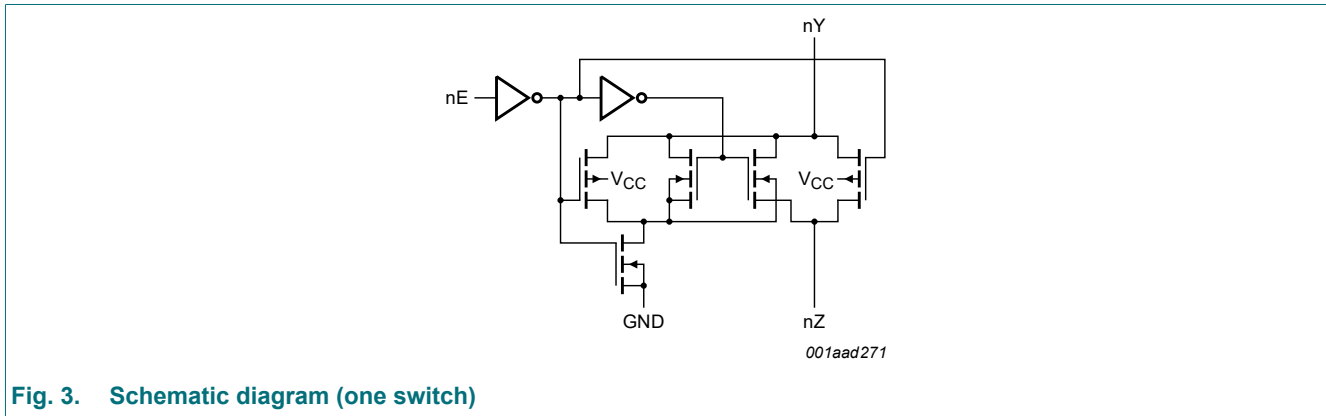


Fig. 3. Schematic diagram (one switch)

5. Pinning information

5.1. Pinning

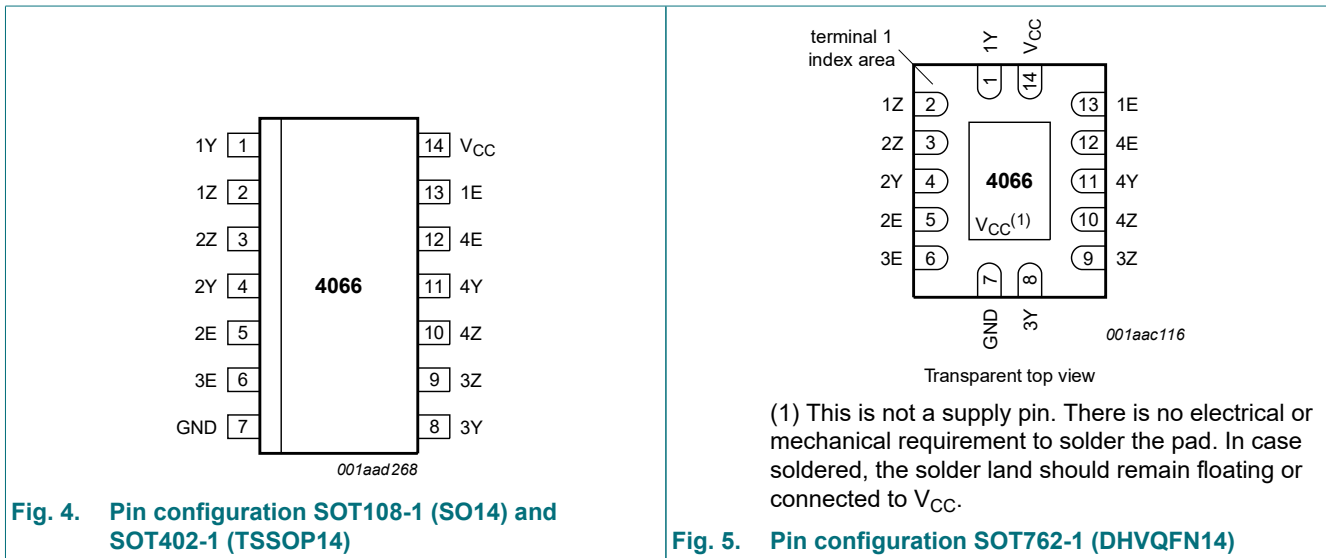


Fig. 4. Pin configuration SOT108-1 (SO14) and SOT402-1 (TSSOP14)

Fig. 5. Pin configuration SOT762-1 (DHVQFN14)

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 _{CC} | 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 V or V _I > V _{CC} + 0.5 V | - | ±20 | mA |
| I _{SK} | switch clamping current | V _{SW} < -0.5 V or V _{SW} > V _{CC} + 0.5 V | - | ±20 | mA |
| I _{SW} | switch current | V _{SW} = -0.5 V to V _{CC} + 0.5 V [1] | - | ±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 °C to +125 °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 Y_n, 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 Y_n. In this case there is no limit for the voltage drop across the switch, but the voltages at Y_n 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-Q100 | | | 74HCT4066-Q100 | | | 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 |
| Δt/ΔV | input transition rise and fall rate | V _{CC} = 2.0 V | - | - | 625 | - | - | - | ns/V |
| | | V _{CC} = 4.5 V | - | 1.67 | 139 | - | 1.67 | 139 | ns/V |
| | | V _{CC} = 6.0 V | - | - | 83 | - | - | - | ns/V |
| | | V _{CC} = 10.0 V | - | - | 35 | - | - | - | ns/V |

9. Static characteristics

Table 6. R_{ON} resistance per switch for types 74HC4066-Q100 and 74HCT4066-Q100

V_I = V_{IH} or V_{IL}; for test circuit see Fig. 6.

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-Q100: V_{CC} - GND = 2.0 V, 4.5 V, 6.0 V and 9.0 V.

For 74HCT4066-Q100: V_{CC} - GND = 4.5 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 V; I _{SW} = 100 μA [2] | - | - | - | - | - | Ω |
| | | V _{CC} = 4.5 V; I _{SW} = 1000 μA | - | 54 | - | 118 | 142 | Ω |
| | | V _{CC} = 6.0 V; I _{SW} = 1000 μA | - | 42 | - | 105 | 126 | Ω |
| | | V _{CC} = 9.0 V; I _{SW} = 1000 μA | - | 32 | - | 88 | 105 | Ω |
| R _{ON(rail)} | ON resistance (rail) | V _{is} = GND | | | | | | |
| | | V _{CC} = 2.0 V; I _{SW} = 100 μA [2] | - | 80 | - | - | - | Ω |
| | | V _{CC} = 4.5 V; I _{SW} = 1000 μA | - | 35 | - | 95 | 115 | Ω |
| | | V _{CC} = 6.0 V; I _{SW} = 1000 μA | - | 27 | - | 82 | 100 | Ω |
| | | V _{CC} = 9.0 V; I _{SW} = 1000 μA | - | 20 | - | 70 | 85 | Ω |
| | | V _{is} = V _{CC} | | | | | | |
| | | V _{CC} = 2.0 V; I _{SW} = 100 μA [2] | - | 100 | - | - | - | Ω |
| | | V _{CC} = 4.5 V; I _{SW} = 1000 μA | - | 42 | - | 106 | 128 | Ω |
| | | V _{CC} = 6.0 V; I _{SW} = 1000 μA | - | 35 | - | 94 | 113 | Ω |
| | | V _{CC} = 9.0 V; I _{SW} = 1000 μA | - | 20 | - | 78 | 95 | Ω |

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|-----------------|---|--------------------------|------------------|--------|-----|-------------------|-----|----------|
| | | | Min | Typ[1] | Max | Min | Max | |
| ΔR_{ON} | ON resistance mismatch between channels | $V_{is} = V_{CC}$ to GND | | | | | | |
| | | $V_{CC} = 2.0$ V | [2] | - | - | - | - | Ω |
| | | $V_{CC} = 4.5$ V | | - | 5 | - | - | Ω |
| | | $V_{CC} = 6.0$ V | | - | 4 | - | - | Ω |
| | | $V_{CC} = 9.0$ V | | - | 3 | - | - | Ω |

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

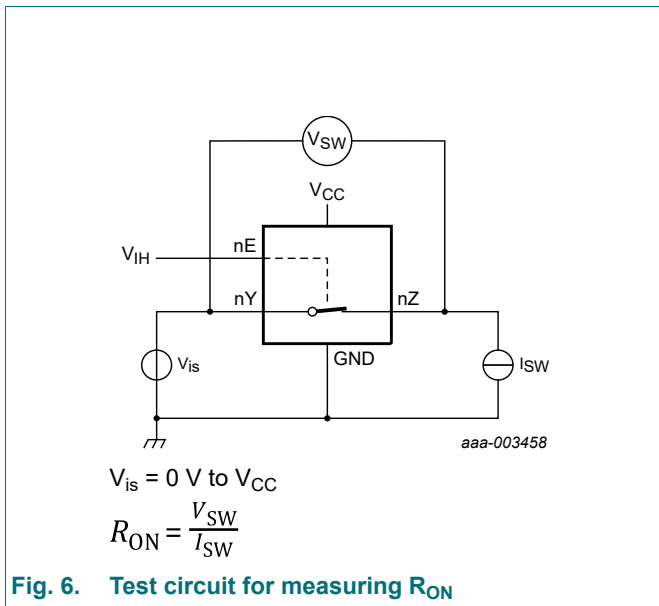


Fig. 6. Test circuit for measuring R_{ON}

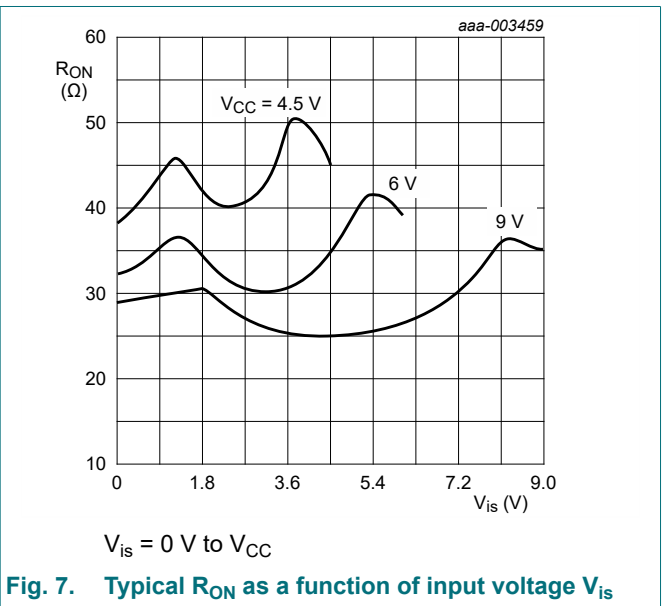


Fig. 7. Typical R_{ON} as a function of input voltage V_{is}

Table 7. Static characteristics 74HC4066-Q100

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 |
|---|---------------------------|--|------|--------|-----------|---------|
| $T_{amb} = -40$ °C to $+85$ °C | | | | | | |
| V_{IH} | HIGH-level input voltage | $V_{CC} = 2.0$ V | 1.5 | 1.2 | - | V |
| | | $V_{CC} = 4.5$ V | 3.15 | 2.4 | - | V |
| | | $V_{CC} = 6.0$ V | 4.2 | 3.2 | - | V |
| | | $V_{CC} = 9.0$ V | 6.3 | 4.7 | - | V |
| V_{IL} | LOW-level input voltage | $V_{CC} = 2.0$ V | - | 0.8 | 0.5 | V |
| | | $V_{CC} = 4.5$ V | - | 2.1 | 1.35 | V |
| | | $V_{CC} = 6.0$ V | - | 2.8 | 1.80 | V |
| | | $V_{CC} = 9.0$ V | - | 4.3 | 2.70 | V |
| I_I | input leakage current | $V_I = V_{CC}$ or GND | | | | |
| | | $V_{CC} = 6.0$ V | - | - | ± 1.0 | μ A |
| | | $V_{CC} = 10.0$ V | - | - | ± 2.0 | μ A |
| $I_{S(OFF)}$ | OFF-state leakage current | $V_{CC} = 10.0$ V; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - GND$; see Fig. 8 | | | | |
| | | per channel | - | - | ± 1.0 | μ A |

| Symbol | Parameter | Conditions | Min | Typ[1] | Max | Unit |
|--|---------------------------|--|------|--------|-----------|---------------|
| $I_{S(ON)}$ | 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. 9 | - | - | ± 1.0 | μA |
| 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 | μA |
| | | $V_{CC} = 10.0\text{ V}$ | - | - | 40.0 | μA |
| C_I | input capacitance | | - | 3.5 | - | pF |
| C_{SW} | switch capacitance | | - | 8 | - | pF |
| $T_{amb} = -40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$ | | | | | | |
| V_{IH} | HIGH-level input voltage | $V_{CC} = 2.0\text{ V}$ | 1.5 | - | - | V |
| | | $V_{CC} = 4.5\text{ V}$ | 3.15 | - | - | V |
| | | $V_{CC} = 6.0\text{ V}$ | 4.2 | - | - | V |
| | | $V_{CC} = 9.0\text{ V}$ | 6.3 | - | - | V |
| V_{IL} | LOW-level input voltage | $V_{CC} = 2.0\text{ V}$ | - | - | 0.50 | V |
| | | $V_{CC} = 4.5\text{ V}$ | - | - | 1.35 | V |
| | | $V_{CC} = 6.0\text{ V}$ | - | - | 1.80 | V |
| | | $V_{CC} = 9.0\text{ V}$ | - | - | 2.70 | V |
| I_I | input leakage current | $V_I = V_{CC}$ or GND | | | | |
| | | $V_{CC} = 6.0\text{ V}$ | - | - | ± 1.0 | μA |
| | | $V_{CC} = 10.0\text{ V}$ | - | - | ± 2.0 | μA |
| $I_{S(OFF)}$ | 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. 8 | | | | |
| | | per channel | - | - | ± 1.0 | μA |
| $I_{S(ON)}$ | 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. 9 | - | - | ± 1.0 | μA |
| I_{CC} | supply current | $V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or V_{CC} ; $V_{os} = V_{CC}$ or GND | | | | |
| | | $V_{CC} = 6.0\text{ V}$ | - | - | 40 | μA |
| | | $V_{CC} = 10.0\text{ V}$ | - | - | 80 | μA |

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

Table 8. Static characteristics 74HCT4066-Q100

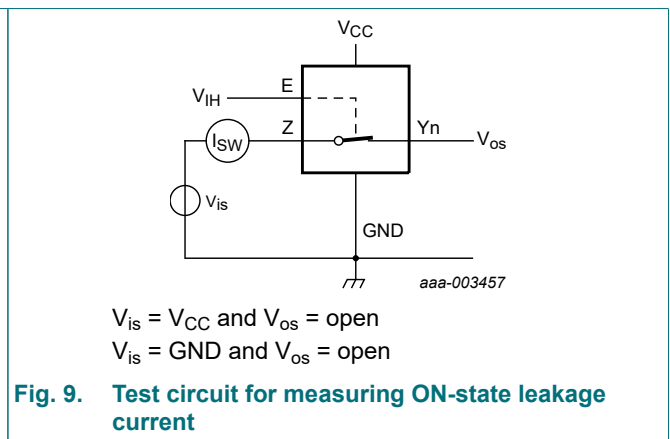
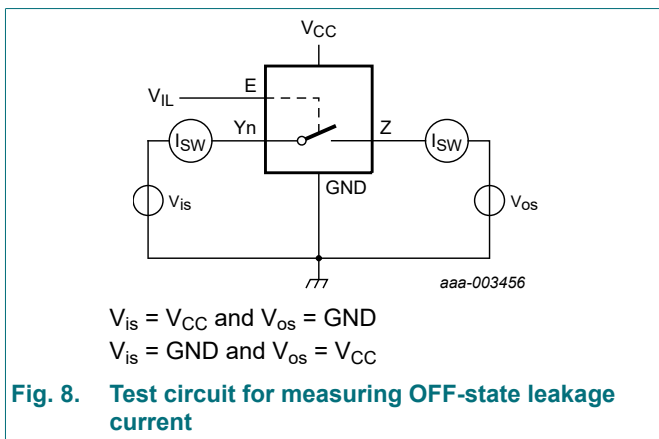
At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

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 |
|---|---------------------------|---|-----|--------|-----------|---------------|
| $T_{amb} = -40\text{ }^{\circ}\text{C to }+85\text{ }^{\circ}\text{C}$ | | | | | | |
| 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; $V_{CC} = 5.5\text{ V}$ | - | - | ± 1.0 | μA |
| $I_{S(OFF)}$ | OFF-state leakage current | $V_{CC} = 5.5\text{ V}$; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Fig. 8 | | | | |
| | | per channel | - | - | ± 1.0 | μA |
| $I_{S(ON)}$ | ON-state leakage current | $V_{CC} = 5.5\text{ V}$; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Fig. 9 | - | - | ± 1.0 | μA |
| I_{CC} | supply current | $V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or V_{CC} ; $V_{os} = V_{CC}$ or GND; $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ | - | - | 20.0 | μA |
| ΔI_{CC} | additional supply current | per input pin; $V_I = V_{CC} - 2.1\text{ V}$; other inputs at V_{CC} or GND; $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ | - | 100 | 450 | μA |
| C_I | input capacitance | | - | 3.5 | - | pF |
| C_{SW} | switch capacitance | | - | 8 | - | pF |
| $T_{amb} = -40\text{ }^{\circ}\text{C to }+125\text{ }^{\circ}\text{C}$ | | | | | | |
| 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; $V_{CC} = 5.5\text{ V}$ | - | - | ± 1.0 | μA |
| $I_{S(OFF)}$ | OFF-state leakage current | $V_{CC} = 5.5\text{ V}$; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Fig. 8 | | | | |
| | | per channel | - | - | ± 1.0 | μA |
| $I_{S(ON)}$ | ON-state leakage current | $V_{CC} = 5.5\text{ V}$; $V_I = V_{IH}$ or V_{IL} ; $ V_{SW} = V_{CC} - \text{GND}$; see Fig. 9 | - | - | ± 1.0 | μA |
| I_{CC} | supply current | $V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or V_{CC} ; $V_{os} = V_{CC}$ or GND; $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ | - | - | 40 | μA |
| ΔI_{CC} | additional supply current | per input pin; $V_I = V_{CC} - 2.1\text{ V}$; other inputs at V_{CC} or GND; $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ | - | - | 490 | μA |

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



10. Dynamic characteristics

Table 9. Dynamic characteristics 74HC4066-Q100

$GND = 0\text{ V}$; $t_r = t_f = 6\text{ ns}$; $C_L = 50\text{ pF}$ unless specified otherwise; for test circuit see Fig. 12.

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. 10 [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 Fig. 11 [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 Fig. 11 [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 μW).

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

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-Q100

$GND = 0\text{ V}$; $t_r = t_f = 6\text{ ns}$; $C_L = 50\text{ pF}$ unless specified otherwise; for test circuit see Fig. 12.

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. 10 [2] | | | | | | |
| | | $V_{CC} = 4.5\text{ V}$ | - | 3 | 15 | - | 18 | ns |
| t_{off} | turn-off time | nE to nY or nZ; see Fig. 11 [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. 11 [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 μW).
 $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$ 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

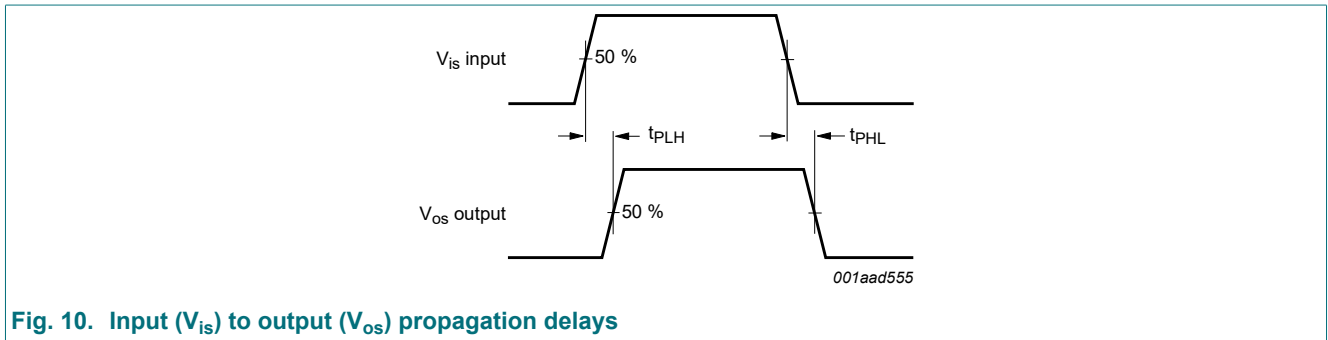


Fig. 10. Input (V_{is}) to output (V_{os}) propagation delays

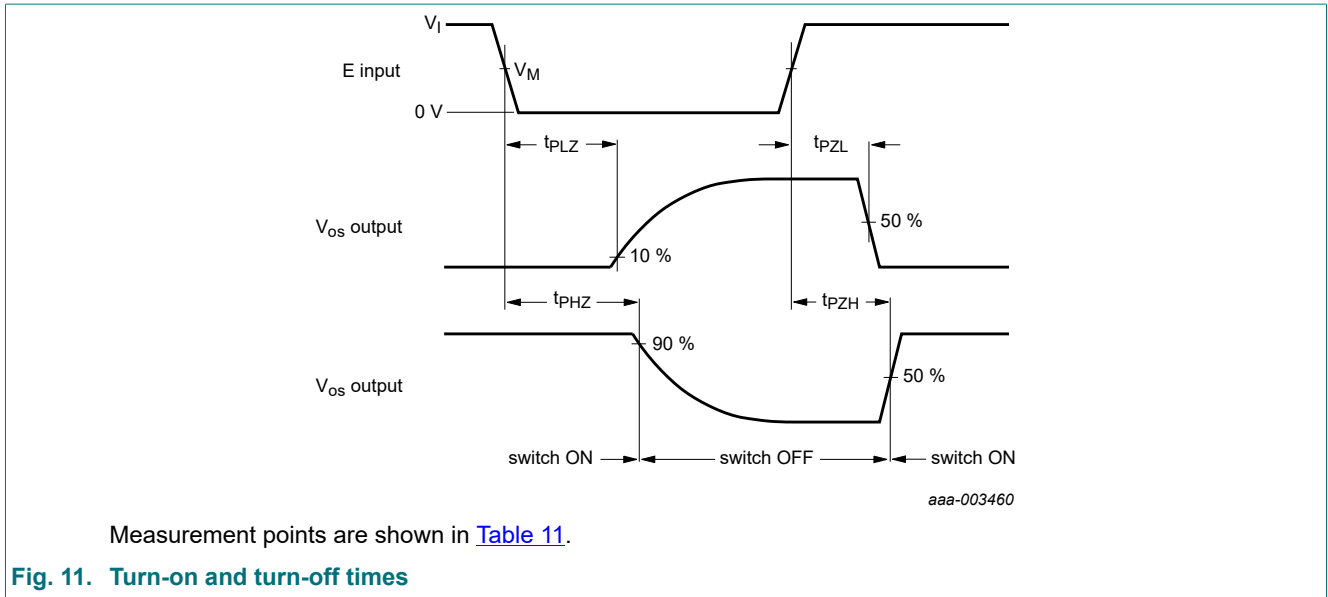


Table 11. Measurement points

| Type | V _I | V _M |
|----------------|-----------------|--------------------|
| 74HC4066-Q100 | V _{CC} | 0.5V _{CC} |
| 74HCT4066-Q100 | 3.0 V | 1.3 V |

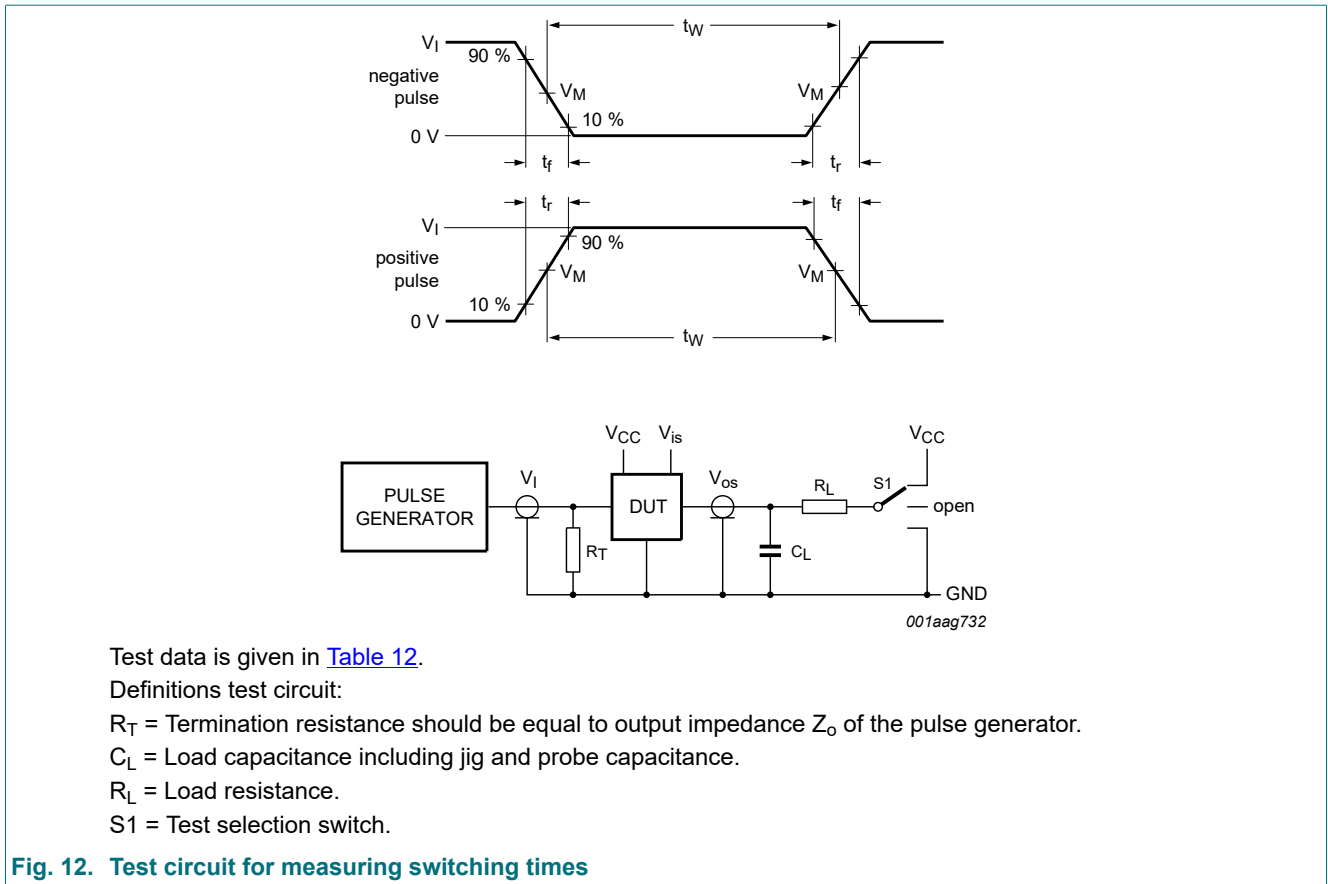


Table 12. Test data

| 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 Ω | GND |
| t_{PLZ}, t_{PZL} | GND to V_{CC} | GND | 6 ns | 50 pF, 15 pF | 1 k Ω | V_{CC} |

[1] For 74HCT4066-Q100: 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 Ω ; $C_L = 50$ pF; see Fig. 13 | | | | % |
| | | $V_{CC} = 4.5$ 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 Ω ; $C_L = 50$ pF; see Fig. 13 | | | | |
| | | $V_{CC} = 4.5$ 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 | $R_L = 50$ Ω ; $C_L = 10$ pF; see Fig. 14 [1] | | | | |
| | | $V_{CC} = 4.5$ V | - | 180 | - | MHz |
| | | $V_{CC} = 9.0$ V | - | 200 | - | MHz |
| α_{iso} | isolation (OFF-state) | $R_L = 600$ Ω ; $C_L = 50$ pF; $f_i = 1$ MHz; see Fig. 15 [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); $R_L = 600$ Ω ; $C_L = 50$ pF; $f_i = 1$ MHz; see Fig. 16 | | | | |
| | | $V_{CC} = 4.5$ V | - | 110 | - | mV |
| | | $V_{CC} = 9.0$ V | - | 220 | - | mV |
| Xtalk | crosstalk | between switches; $R_L = 600$ Ω ; $C_L = 50$ pF; $f_i = 1$ MHz; see Fig. 17 [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 Ω). 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 Ω).

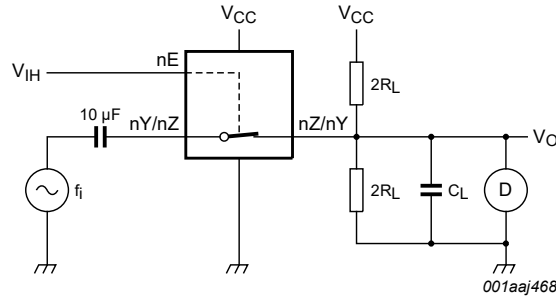
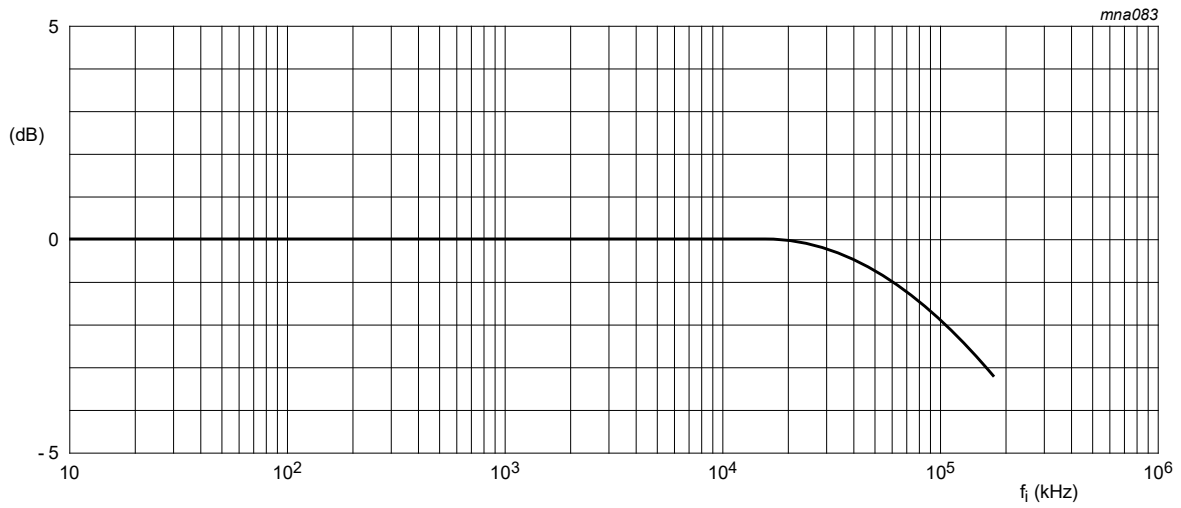
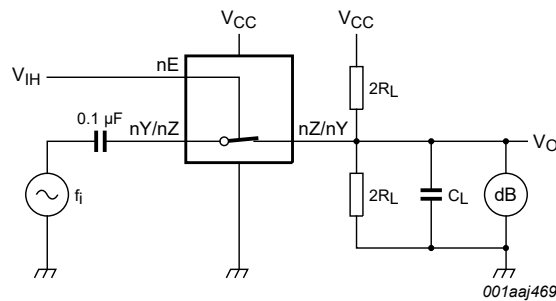


Fig. 13. Test circuit for measuring total harmonic distortion



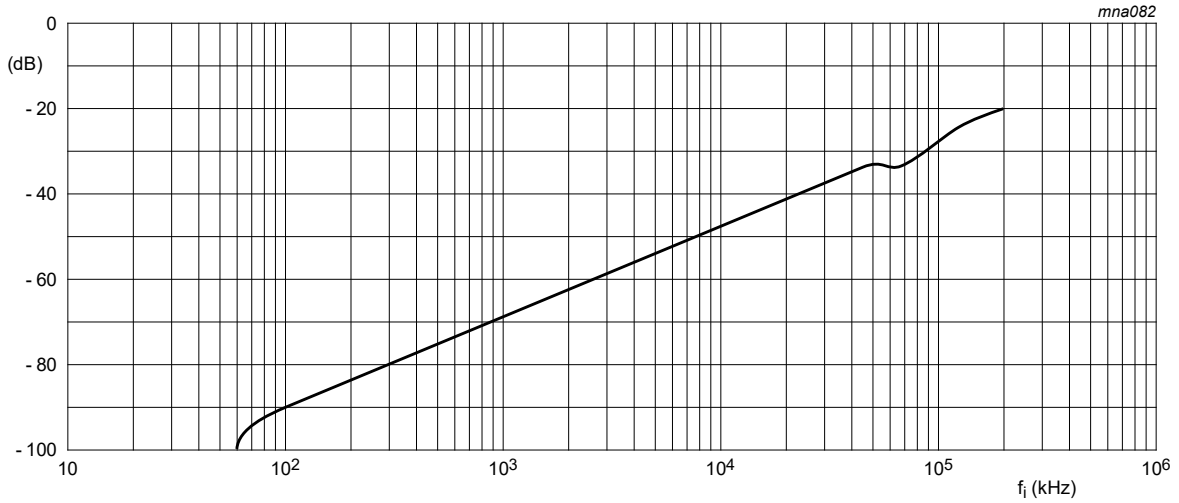
a. Typical -3 dB frequency response



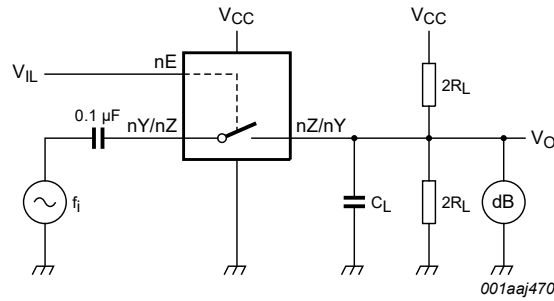
b. Test circuit

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

Fig. 14. -3 dB frequency response as a function of frequency



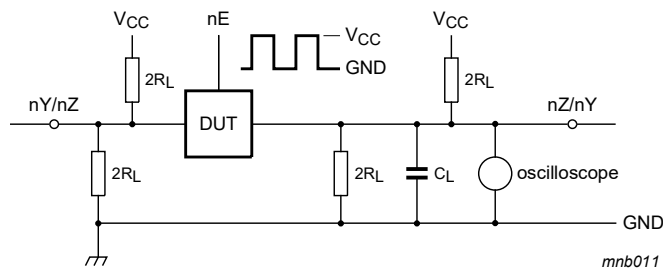
a. Isolation (OFF-state)



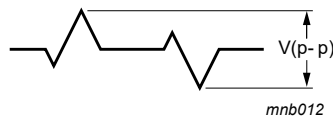
b. Test circuit

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

Fig. 15. Isolation (OFF-state) as a function of frequency



a. Test circuit



b. Crosstalk voltage

Fig. 16. Test circuit for measuring crosstalk voltage (between the digital input and the switch)

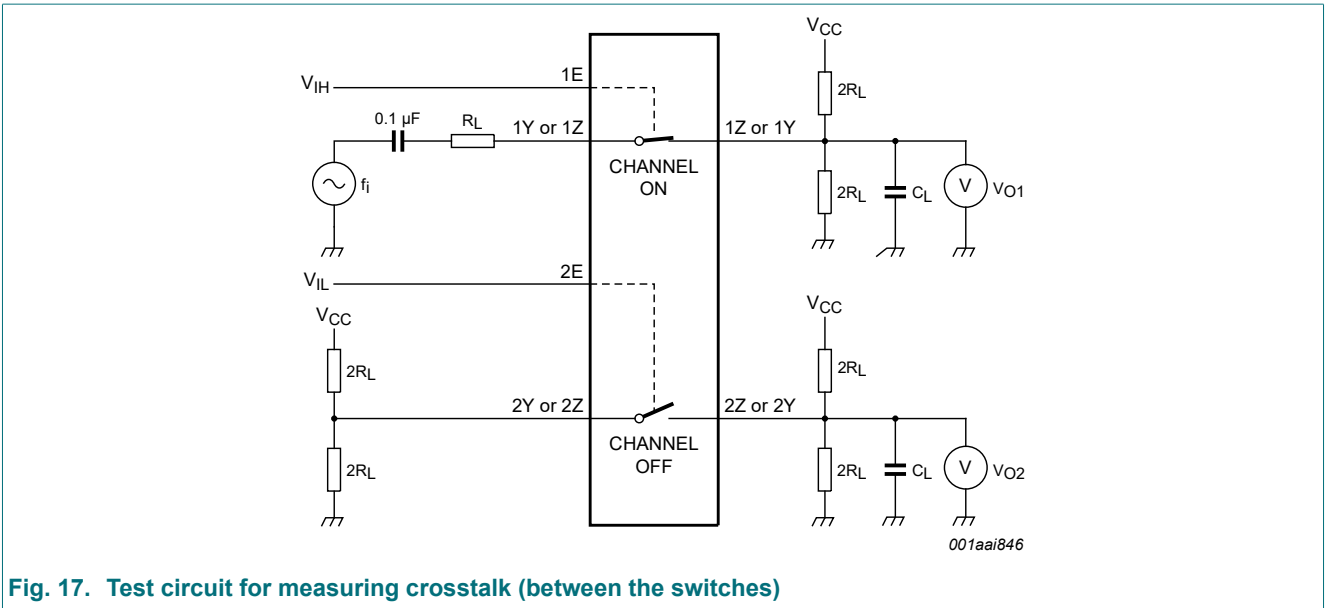


Fig. 17. Test circuit for measuring crosstalk (between the switches)

12. Package outline

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

SOT108-1

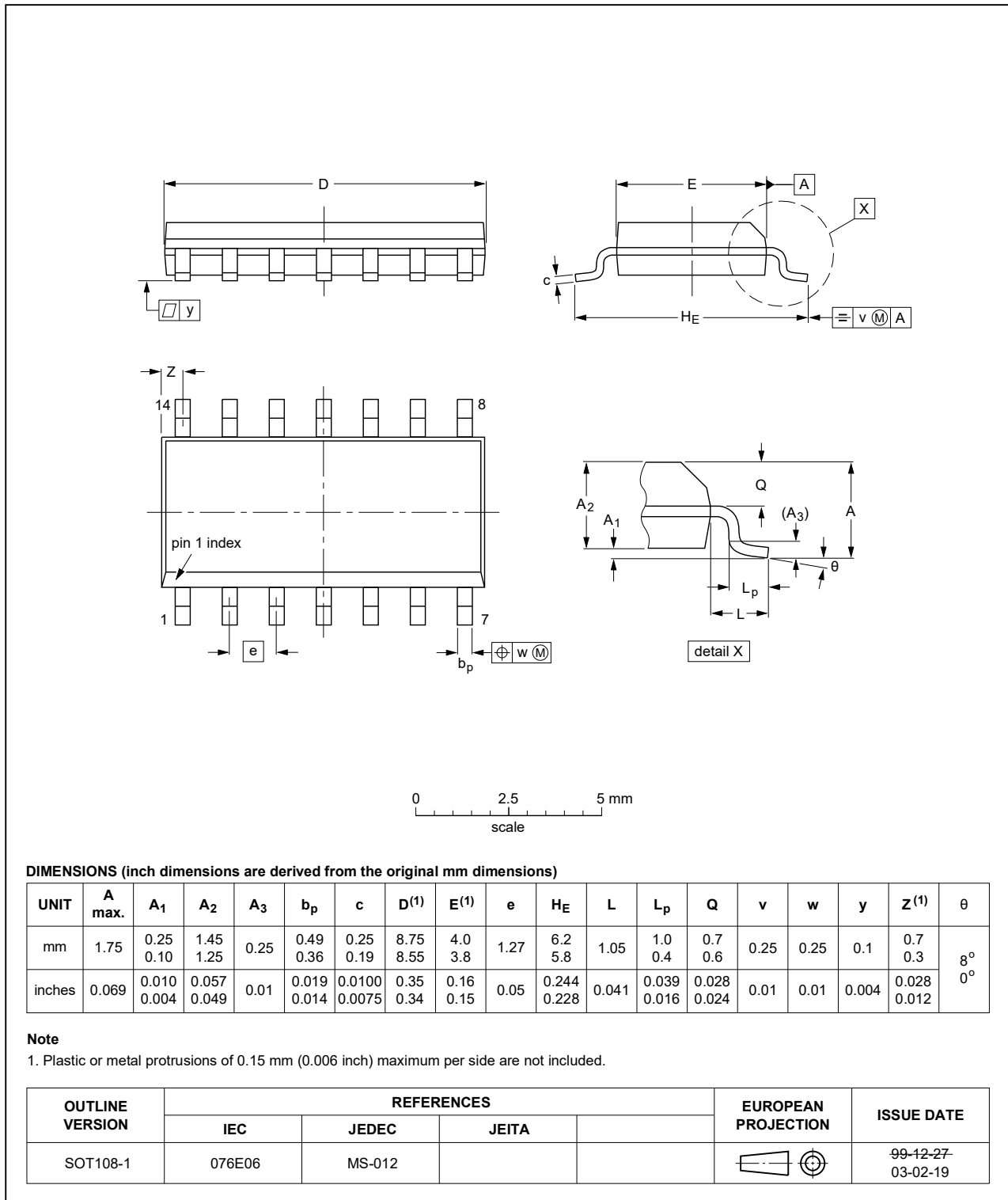


Fig. 18. Package outline SOT108-1 (SO14)

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

SOT402-1

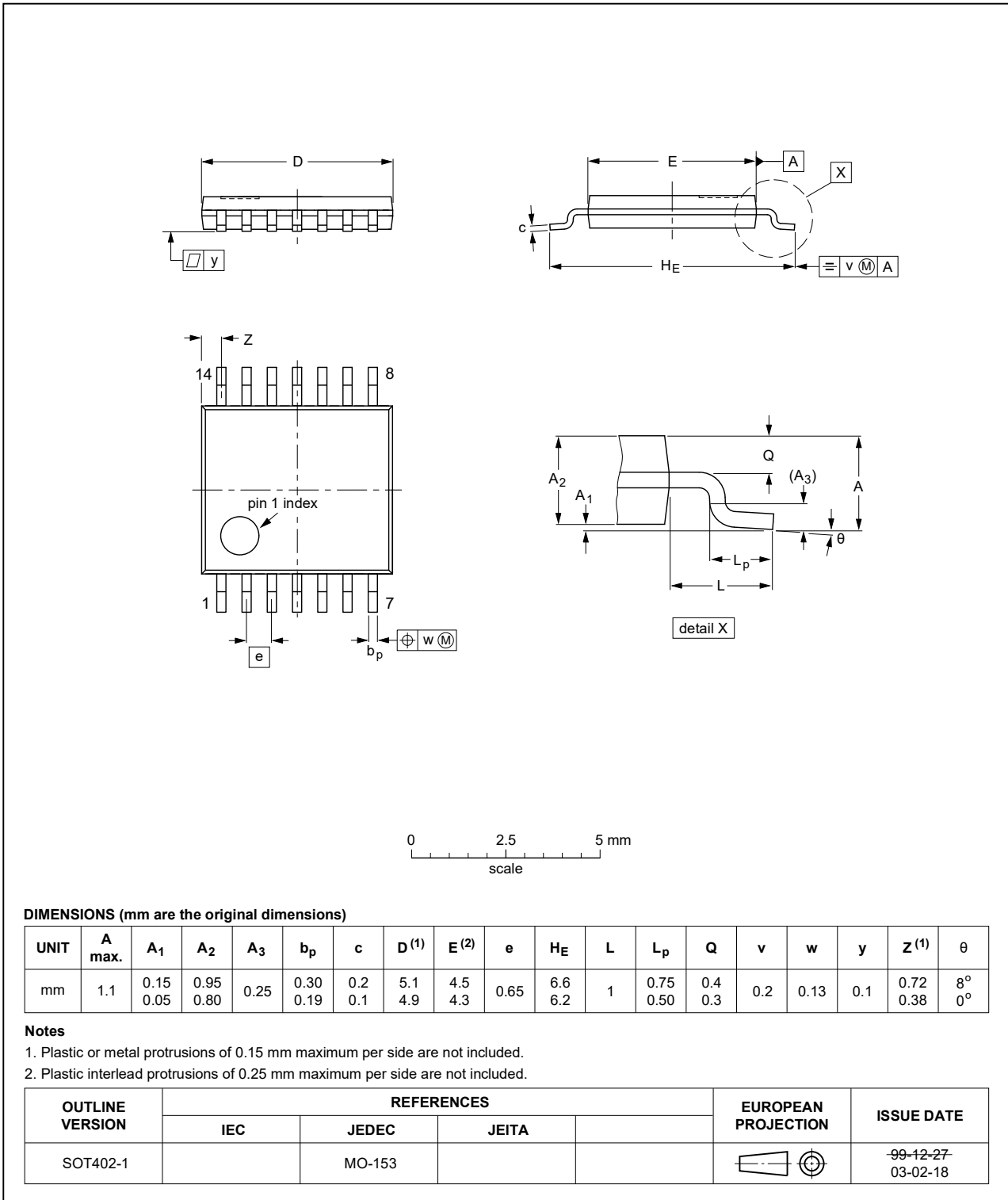


Fig. 19. Package outline SOT402-1 (TSSOP14)

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

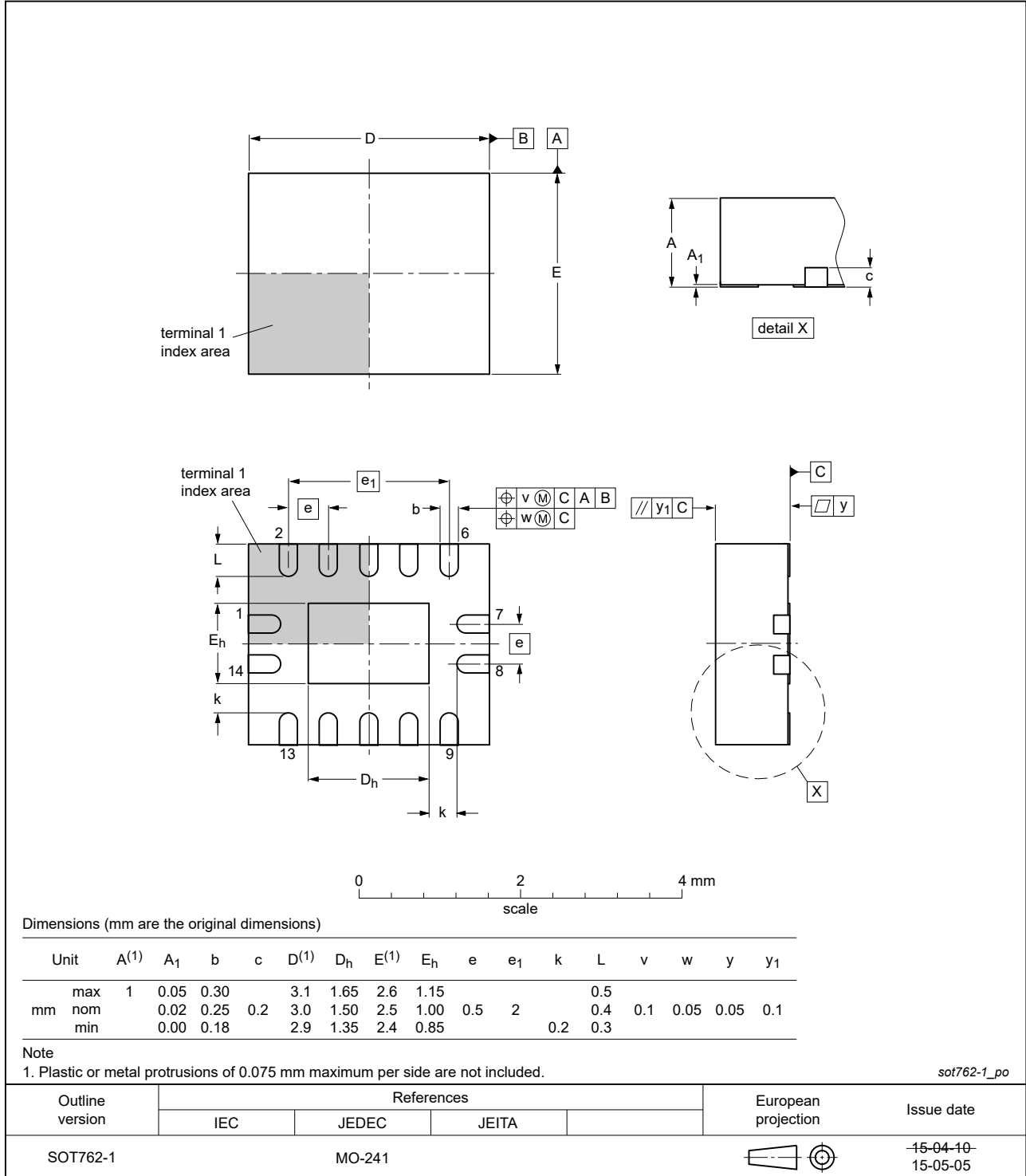


Fig. 20. Package outline SOT762-1 (DHVQFN14)

13. Abbreviations

Table 14. 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 |

14. Revision history

Table 15. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-----------------------|---|--------------------|---------------|-----------------------|
| 74HC_HCT4066_Q100 v.4 | 20200414 | Product data sheet | - | 74HC_HCT4066_Q100 v.3 |
| Modifications: | <ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. Table 4: Derating values for P_{tot} total power dissipation have been updated. Table 9: C_{PD} value of 74HC4066-Q100 moved to typical column. Package outline drawing of SOT762-1 (Fig. 20) updated. | | | |
| 74HC_HCT4066_Q100 v.3 | 20131216 | Product data sheet | - | 74HC_HCT4066_Q100 v.2 |
| Modifications: | <ul style="list-style-type: none"> Features and benefits updated (errata). | | | |
| 74HC_HCT4066_Q100 v.2 | 20130404 | Product data sheet | - | 74HC_HCT4066_Q100 v.1 |
| Modifications: | <ul style="list-style-type: none"> Descriptive title corrected (errata). New general description (errata). | | | |
| 74HC_HCT4066_Q100 v.1 | 20120712 | Product data sheet | - | - |

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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