

# 74HC1G66; 74HCT1G66

Single-pole single-throw analog switch

Rev. 04 — 19 December 2008

Product data sheet

## 1. General description

74HC1G66 and 74HCT1G66 are high-speed Si-gate CMOS devices. They are single-pole single-throw analog switches. The switch has two input/output pins (Y and Z) and an active HIGH enable input pin (E). When pin E is LOW, the analog switch is turned off.

The non-standard output currents are equal to those of the 74HC4066 and 74HCT4066.

## 2. Features

- Wide supply voltage range from 2.0 V to 10.0 V for the 74HC1G66
- Very low ON resistance:
  - ◆ 45  $\Omega$  (typ.) at  $V_{CC} = 4.5$  V
  - ◆ 30  $\Omega$  (typ.) at  $V_{CC} = 6.0$  V
  - ◆ 25  $\Omega$  (typ.) at  $V_{CC} = 9.0$  V
- High noise immunity
- Low power dissipation
- Multiple package options
- ESD protection:
  - ◆ HBM JESD22-A114E exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
- Specified from  $-40$  °C to  $+85$  °C and  $-40$  °C to  $+125$  °C

## 3. Ordering information

Table 1. Ordering information

| Type number               | Package               |        |   |          |
|---------------------------|-----------------------|--------|---|----------|
|                           | Temperature range     | Name   | Description   | Version  |
| 74HC1G66GW<br>74HCT1G66GW | $-40$ °C to $+125$ °C | TSSOP5 | plastic thin shrink small outline package;<br>5 leads; body width 1.25 mm | SOT353-1 |
| 74HC1G66GV<br>74HCT1G66GV | $-40$ °C to $+125$ °C | SC-74A | plastic surface-mounted package; 5 leads                                  | SOT753   |

## 4. Marking

Table 2. Marking codes

| Type number | Marking |
|-------------|---------|
| 74HC1G66GW  | HL      |
| 74HCT1G66GW | TL      |
| 74HC1G66GV  | H66     |
| 74HCT1G66GV | T66     |

## 5. Functional diagram

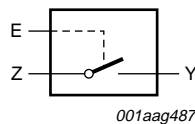


Fig 1. Logic symbol

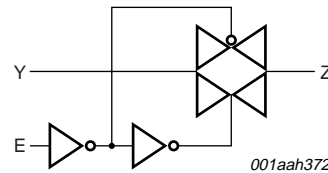


Fig 2. Logic diagram

## 6. Pinning information

### 6.1 Pinning

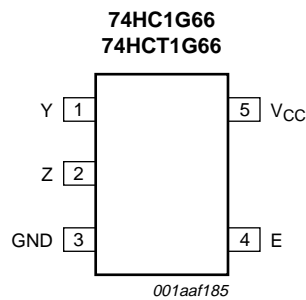


Fig 3. Pin configuration SOT353-1 and SOT753

### 6.2 Pin description

Table 3. Pin description

| Symbol          | Pin | Description                 |
|-----------------|-----|-----------------------------|
| Y               | 1   | independent input or output |
| Z               | 2   | independent input or output |
| GND             | 3   | ground (0 V)                |
| E               | 4   | enable input (active HIGH)  |
| V <sub>CC</sub> | 5   | supply voltage              |

## 7. Functional description

**Table 4.** Function table<sup>[1]</sup>

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

[1] H = HIGH voltage level; L = LOW voltage level.

## 8. Limiting values

**Table 5.** 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 $V_I > V_{CC} + 0.5\text{ V}$       | [1] - | ±20   | mA   |
| $I_{SK}$  | switch clamping current | $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$       | [1] - | ±20   | mA   |
| $I_{SW}$  | switch current          | $V_{SW} > -0.5\text{ V}$ or $V_{SW} < V_{CC} + 0.5\text{ V}$ | -     | ±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] - | 250   | mW   |

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

[2] For TSSOP5 and SC-74A packages: above 87.5 °C the value of  $P_{tot}$  derates linearly with 4.0 mW/K.

## 9. Recommended operating conditions

**Table 6.** Recommended operating conditions

Voltages are referenced to GND (ground = 0 V).<sup>[1]</sup>

| Symbol              | Parameter                           | Conditions               | 74HC1G66 |      |          | 74HCT1G66 |      |          | 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                       |                          | 0        | -    | $V_{CC}$ | 0         | -    | $V_{CC}$ | V    |
| $V_{SW}$            | switch voltage                      |                          | 0        | -    | $V_{CC}$ | 0         | -    | $V_{CC}$ | V    |
| $T_{amb}$           | ambient temperature                 |                          | -40      | +25  | +125     | -40       | +25  | +125     | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 2.0\text{ V}$  | -        | -    | 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 |

[1] To avoid drawing  $V_{CC}$  current out of pin Z, when switch current flows in pin Y, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into pin Z, no  $V_{CC}$  current will flow out of terminal Y. In this case there is no limit for the voltage drop across the switch, but the voltage at pins Y and Z may not exceed  $V_{CC}$  or GND.

## 10. Static characteristics

**Table 7. Static characteristics**

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

| Symbol              | Parameter                 | Conditions  | -40 °C to +85 °C |                    |      | -40 °C to +125 °C |      | Unit |
|---------------------|---------------------------|---|------------------|--------------------|------|-------------------|------|------|
|                     |                           |   | Min              | Typ <sup>[1]</sup> | Max  | Min               | Max  |      |
| <b>74HC1G66</b>     |                           |   |                  |                    |      |                   |      |      |
| V <sub>IH</sub>     | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V   | 1.5              | 1.2                | -    | 1.5               | -    | V    |
|                     |                           | V <sub>CC</sub> = 4.5 V   | 3.15             | 2.4                | -    | 3.15              | -    | V    |
|                     |                           | V <sub>CC</sub> = 6.0 V   | 4.2              | 3.2                | -    | 4.2               | -    | V    |
|                     |                           | V <sub>CC</sub> = 9.0 V   | 6.3              | 4.7                | -    | 6.3               | -    | V    |
| V <sub>IL</sub>     | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V   | -                | 0.8                | 0.5  | -                 | 0.5  | V    |
|                     |                           | V <sub>CC</sub> = 4.5 V   | -                | 2.1                | 1.35 | -                 | 1.35 | V    |
|                     |                           | V <sub>CC</sub> = 6.0 V   | -                | 2.8                | 1.8  | -                 | 1.8  | V    |
|                     |                           | V <sub>CC</sub> = 9.0 V   | -                | 4.3                | 2.7  | -                 | 2.7  | V    |
| I <sub>I</sub>      | input leakage current     | E; V <sub>I</sub> = V <sub>CC</sub> or GND  |                  |                    |      |                   |      |      |
|                     |                           | V <sub>CC</sub> = 6.0 V   | -                | 0.1                | 1.0  | -                 | 1.0  | μA   |
|                     |                           | V <sub>CC</sub> = 10.0 V  | -                | 0.2                | 2.0  | -                 | 2.0  | μA   |
| I <sub>S(OFF)</sub> | OFF-state leakage current | Y or Z; V <sub>CC</sub> = 10 V; see <a href="#">Figure 4</a>                                    | -                | 0.1                | 1.0  | -                 | 1.0  | μA   |
| I <sub>S(ON)</sub>  | ON-state leakage current  | Y or Z; V <sub>CC</sub> = 10 V; see <a href="#">Figure 5</a>                                    | -                | 0.1                | 1.0  | -                 | 1.0  | μA   |
| I <sub>CC</sub>     | supply current            | E, Y or Z; V <sub>I</sub> = V <sub>CC</sub> or GND;<br>V <sub>SW</sub> = GND or V <sub>CC</sub> |                  |                    |      |                   |      |      |
|                     |                           | V <sub>CC</sub> = 6.0 V   | -                | 1.0                | 10   | -                 | 20   | μA   |
|                     |                           | V <sub>CC</sub> = 10.0 V  | -                | 2.0                | 20   | -                 | 40   | μA   |
| C <sub>I</sub>      | input capacitance         |   | -                | 1.5                | -    | -                 | -    | pF   |
| C <sub>S(ON)</sub>  | ON-state capacitance      |   | -                | 8                  | -    | -                 | -    | pF   |

**Table 7. Static characteristics ...continued**  
 Voltages are referenced to GND (ground = 0 V).

| Symbol              | Parameter                 | Conditions  | -40 °C to +85 °C |                    |     | -40 °C to +125 °C |     | Unit |
|---------------------|---------------------------|---|------------------|--------------------|-----|-------------------|-----|------|
|                     |                           |   | Min              | Typ <sup>[1]</sup> | Max | Min               | Max |      |
| <b>74HCT1G66</b>    |                           |   |                  |                    |     |                   |     |      |
| V <sub>IH</sub>     | HIGH-level input voltage  | V <sub>CC</sub> = 4.5 V to 5.5 V  | 2.0              | 1.6                | -   | 2.0               | -   | V    |
| V <sub>IL</sub>     | LOW-level input voltage   | V <sub>CC</sub> = 4.5 V to 5.5 V  | 0.1              | 1.2                | 0.8 | -                 | 0.8 | V    |
| I <sub>I</sub>      | input leakage current     | E; V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V   | -                | 0.1                | 1.0 | -                 | 1.0 | μA   |
| I <sub>S(OFF)</sub> | OFF-state leakage current | Y or Z; V <sub>CC</sub> = 5.5 V; see <a href="#">Figure 4</a>   | -                | 0.1                | 1.0 | -                 | 1.0 | μA   |
| I <sub>S(ON)</sub>  | ON-state leakage current  | Y or Z; V <sub>CC</sub> = 5.5 V; see <a href="#">Figure 5</a>   | -                | 0.1                | 1.0 | -                 | 1.0 | μA   |
| I <sub>CC</sub>     | supply current            | E, Y or Z; V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>SW</sub> = GND or V <sub>CC</sub> ; V <sub>CC</sub> = 4.5 V to 5.5 V | -                | 1                  | 10  | -                 | 20  | μA   |
| ΔI <sub>CC</sub>    | additional supply current | V <sub>I</sub> = V <sub>CC</sub> - 2.1 V; V <sub>CC</sub> = 4.5 V to 5.5 V; I <sub>O</sub> = 0 A                                | -                | -                  | 500 | -                 | 850 | μA   |
| C <sub>I</sub>      | input capacitance         |   | -                | 1.5                | -   | -                 | -   | pF   |
| C <sub>S(ON)</sub>  | ON-state capacitance      |   | -                | 8                  | -   | -                 | -   | pF   |

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

## 10.1 Test circuits

V<sub>I</sub> = V<sub>CC</sub> or GND and V<sub>O</sub> = GND or V<sub>CC</sub>.

**Fig 4. Test circuit for measuring OFF-state leakage current**

V<sub>I</sub> = V<sub>CC</sub> or GND and V<sub>O</sub> = open circuit.

**Fig 5. Test circuit for measuring ON-state leakage current**

## 10.2 ON resistance

**Table 8. ON resistance**

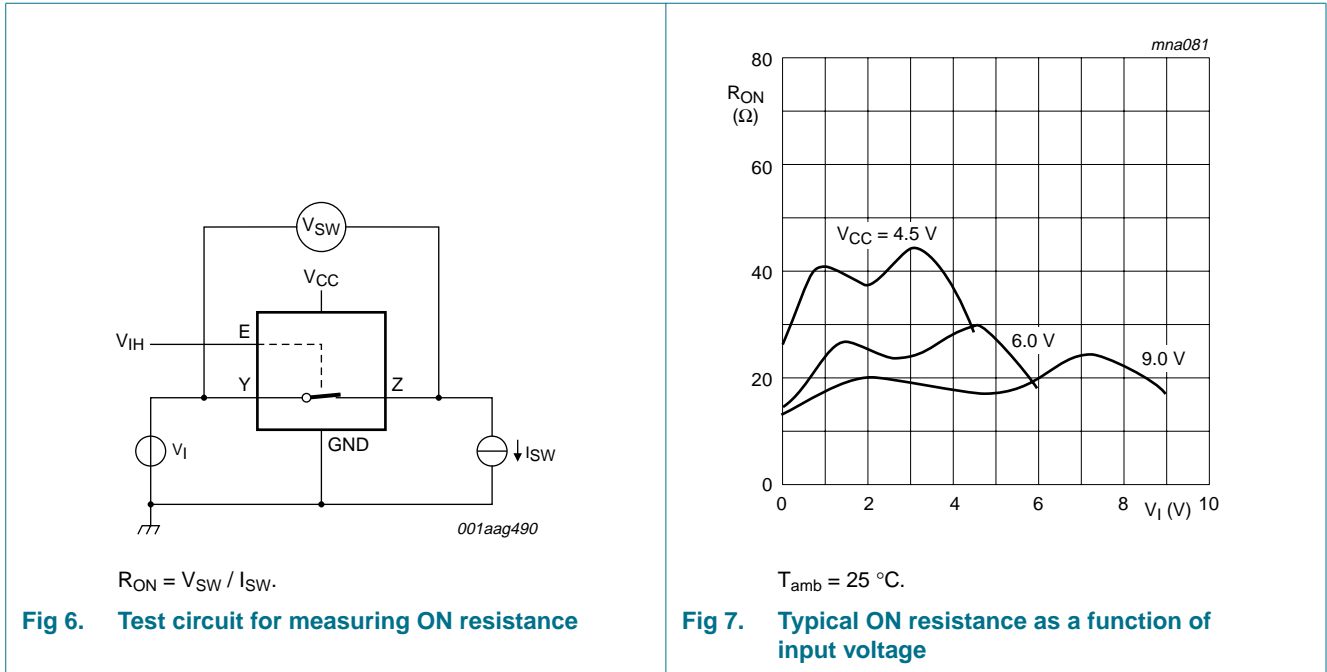
At recommended operating conditions; voltages are referenced to GND (ground 0 V); for graph see [Figure 7](#).

| Symbol                        | Parameter            | Conditions   | –40 °C to +85 °C |                    |     | –40 °C to +125 °C |     | Unit |
|-------------------------------|----------------------|--|------------------|--------------------|-----|-------------------|-----|------|
|                               |                      |  | Min              | Typ <sup>[2]</sup> | Max | Min               | Max |      |
| <b>74HC1G66<sup>[1]</sup></b> |                      |  |                  |                    |     |                   |     |      |
| R <sub>ON(peak)</sub>         | ON resistance (peak) | V <sub>I</sub> = GND to V <sub>CC</sub> ; see <a href="#">Figure 6</a> |                  |                    |     |                   |     |      |
|                               |                      | I <sub>SW</sub> = 0.1 mA; V <sub>CC</sub> = 2.0 V                      | -                | -                  | -   | -                 | -   | Ω    |
|                               |                      | I <sub>SW</sub> = 1 mA; V <sub>CC</sub> = 4.5 V                        | -                | 42                 | 118 | -                 | 142 | Ω    |
|                               |                      | I <sub>SW</sub> = 1 mA; V <sub>CC</sub> = 6.0 V                        | -                | 31                 | 105 | -                 | 126 | Ω    |
|                               |                      | I <sub>SW</sub> = 1 mA; V <sub>CC</sub> = 9.0 V                        | -                | 23                 | 88  | -                 | 105 | Ω    |
| R <sub>ON(rail)</sub>         | ON resistance (rail) | V <sub>I</sub> = GND; see <a href="#">Figure 6</a>                     |                  |                    |     |                   |     |      |
|                               |                      | I <sub>SW</sub> = 0.1 mA; V <sub>CC</sub> = 2.0 V                      | -                | 75                 | -   | -                 | -   | Ω    |
|                               |                      | I <sub>SW</sub> = 1 mA; V <sub>CC</sub> = 4.5 V                        | -                | 29                 | 95  | -                 | 115 | Ω    |
|                               |                      | I <sub>SW</sub> = 1 mA; V <sub>CC</sub> = 6.0 V                        | -                | 23                 | 82  | -                 | 100 | Ω    |
|                               |                      | I <sub>SW</sub> = 1 mA; V <sub>CC</sub> = 9.0 V                        | -                | 18                 | 70  | -                 | 80  | Ω    |
|                               |                      | V <sub>I</sub> = V <sub>CC</sub> ; see <a href="#">Figure 6</a>        |                  |                    |     |                   |     |      |
|                               |                      | I <sub>SW</sub> = 0.1 mA; V <sub>CC</sub> = 2.0 V                      | -                | 75                 | -   | -                 | -   | Ω    |
|                               |                      | I <sub>SW</sub> = 1 mA; V <sub>CC</sub> = 4.5 V                        | -                | 35                 | 106 | -                 | 128 | Ω    |
|                               |                      | I <sub>SW</sub> = 1 mA; V <sub>CC</sub> = 6.0 V                        | -                | 27                 | 94  | -                 | 113 | Ω    |
|                               |                      | I <sub>SW</sub> = 1 mA; V <sub>CC</sub> = 9.0 V                        | -                | 21                 | 78  | -                 | 95  | Ω    |
| <b>74HCT1G66</b>              |                      |  |                  |                    |     |                   |     |      |
| R <sub>ON(peak)</sub>         | ON resistance (peak) | V <sub>I</sub> = GND to V <sub>CC</sub> ; see <a href="#">Figure 6</a> |                  |                    |     |                   |     |      |
|                               |                      | I <sub>SW</sub> = 1 mA; V <sub>CC</sub> = 4.5 V                        | -                | 42                 | 118 | -                 | 142 | Ω    |
| R <sub>ON(rail)</sub>         | ON resistance (rail) | V <sub>I</sub> = GND; see <a href="#">Figure 6</a>                     |                  |                    |     |                   |     |      |
|                               |                      | I <sub>SW</sub> = 1 mA; V <sub>CC</sub> = 4.5 V                        | -                | 29                 | 95  | -                 | 115 | Ω    |
|                               |                      | V <sub>I</sub> = V <sub>CC</sub> ; see <a href="#">Figure 6</a>        |                  |                    |     |                   |     |      |
|                               |                      | I <sub>SW</sub> = 1 mA; V <sub>CC</sub> = 4.5 V                        | -                | 35                 | 106 | -                 | 128 | Ω    |

[1] At supply voltages approaching 2 V, the ON resistance becomes extremely non-linear. Therefore it is recommended that these devices be used to transmit digital signals only, when using this supply voltage.

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

10.3 ON resistance test circuit and graphs



11. Dynamic characteristics

Table 9. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V);  $C_L = 50\text{ pF}$ ;  $R_L = 1\text{ k}\Omega$ , unless otherwise specified; For test circuit see Figure 10.

| Symbol          | Parameter         | Conditions  | -40 °C to +85 °C |                    |     | -40 °C to +125 °C |     | Unit |
|-----------------|-------------------|---|------------------|--------------------|-----|-------------------|-----|------|
|                 |                   |   | Min              | Typ <sup>[1]</sup> | Max | Min               | Max |      |
| <b>74HC1G66</b> |                   |   |                  |                    |     |                   |     |      |
| $t_{pd}$        | propagation delay | Y to Z or Z to Y; $R_L = \infty\ \Omega$ ; see Figure 8 |                  | [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   |
|                 |                   | $V_{CC} = 9.0\text{ V}$                                 | -                | 1                  | 10  | -                 | 12  | ns   |
| $t_{en}$        | enable time       | E to Y or Z; see Figure 9                               |                  | [2]                |     |                   |     |      |
|                 |                   | $V_{CC} = 2.0\text{ V}$                                 | -                | 50                 | 125 | -                 | 150 | ns   |
|                 |                   | $V_{CC} = 4.5\text{ V}$                                 | -                | 16                 | 25  | -                 | 30  | ns   |
|                 |                   | $V_{CC} = 5.0\text{ V}$ ; $C_L = 15\text{ pF}$          | -                | 11                 | -   | -                 | -   | ns   |
|                 |                   | $V_{CC} = 6.0\text{ V}$                                 | -                | 13                 | 21  | -                 | 26  | ns   |
|                 |                   | $V_{CC} = 9.0\text{ V}$                                 | -                | 9                  | 16  | -                 | 20  | ns   |

**Table 9. Dynamic characteristics ...continued**

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF;  $R_L = 1$  k $\Omega$ , unless otherwise specified;

For test circuit see [Figure 10](#).

| Symbol    | Parameter                     | Conditions   | –40 °C to +85 °C |                    |     | –40 °C to +125 °C |     | Unit |
|-----------|-------------------------------|--|------------------|--------------------|-----|-------------------|-----|------|
|           |                               |  | Min              | Typ <sup>[1]</sup> | Max | Min               | Max |      |
| $t_{dis}$ | disable time                  | E to Y or Z; see <a href="#">Figure 9</a> <sup>[2]</sup> |                  |                    |     |                   |     |      |
|           |                               | $V_{CC} = 2.0$ V   | -                | 27                 | 190 | -                 | 225 | ns   |
|           |                               | $V_{CC} = 4.5$ V   | -                | 16                 | 38  | -                 | 45  | ns   |
|           |                               | $V_{CC} = 5.0$ V; $C_L = 15$ pF                          | -                | 11                 | -   | -                 | -   | ns   |
|           |                               | $V_{CC} = 6.0$ V   | -                | 14                 | 33  | -                 | 38  | ns   |
|           |                               | $V_{CC} = 9.0$ V   | -                | 12                 | 16  | -                 | 20  | ns   |
| $C_{PD}$  | power dissipation capacitance | $V_I = \text{GND to } V_{CC}$ <sup>[3]</sup>             | -                | 9                  | -   | -                 | -   | pF   |

**74HCT1G66**

|           |                               |   |   |    |    |   |    |    |
|-----------|-------------------------------|---|---|----|----|---|----|----|
| $t_{pd}$  | propagation delay             | Y to Z or Z to Y; $R_L = \infty$ $\Omega$ ; see <a href="#">Figure 8</a> <sup>[2]</sup> |   |    |    |   |    |    |
|           |                               | $V_{CC} = 4.5$ V  | - | 3  | 15 | - | 18 | ns |
| $t_{en}$  | enable time                   | E to Y or Z; see <a href="#">Figure 9</a> <sup>[2]</sup>                                |   |    |    |   |    |    |
|           |                               | $V_{CC} = 4.5$ V  | - | 15 | 30 | - | 36 | ns |
|           |                               | $V_{CC} = 5.0$ V; $C_L = 15$ pF   | - | 12 | -  | - | -  | ns |
| $t_{dis}$ | disable time                  | E to Y or Z; see <a href="#">Figure 9</a> <sup>[2]</sup>                                |   |    |    |   |    |    |
|           |                               | $V_{CC} = 4.5$ V  | - | 13 | 44 | - | 53 | ns |
|           |                               | $V_{CC} = 5.0$ V; $C_L = 15$ pF   | - | 12 | -  | - | -  | ns |
| $C_{PD}$  | power dissipation capacitance | $V_I = \text{GND to } V_{CC} - 1.5$ V <sup>[3]</sup>                                    | - | 9  | -  | - | -  | pF |

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

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

$t_{en}$  is the same as  $t_{PZL}$  and  $t_{PZH}$ .

$t_{dis}$  is the same as  $t_{PLZ}$  and  $t_{PHZ}$ .

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

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

$C_L$  = output load capacitance in pF;

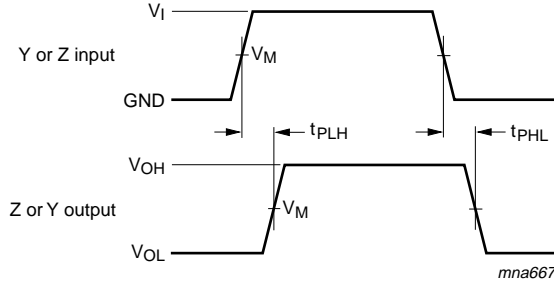
$C_{SW}$  = maximum switch capacitance in pF (see [Table 7](#));

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

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



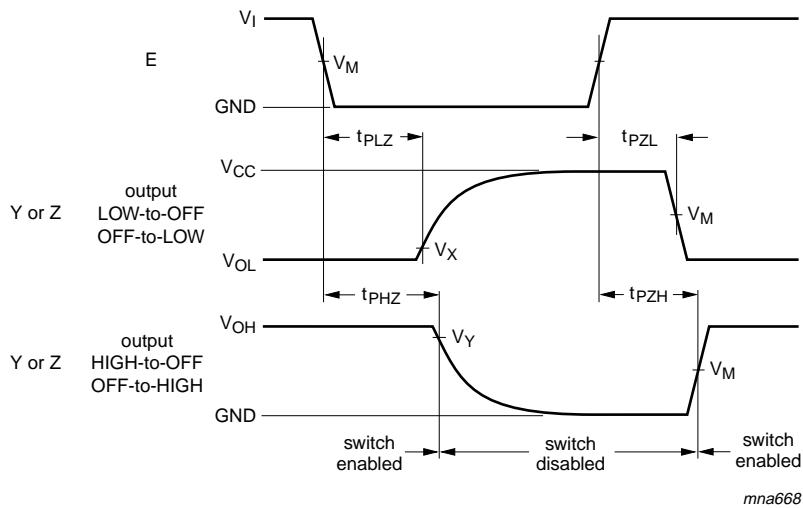
## 11.1 Waveforms and test circuit



Measurement points are given in [Table 10](#).

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

**Fig 8. Input (Y or Z) to output (Z or Y) propagation delays**



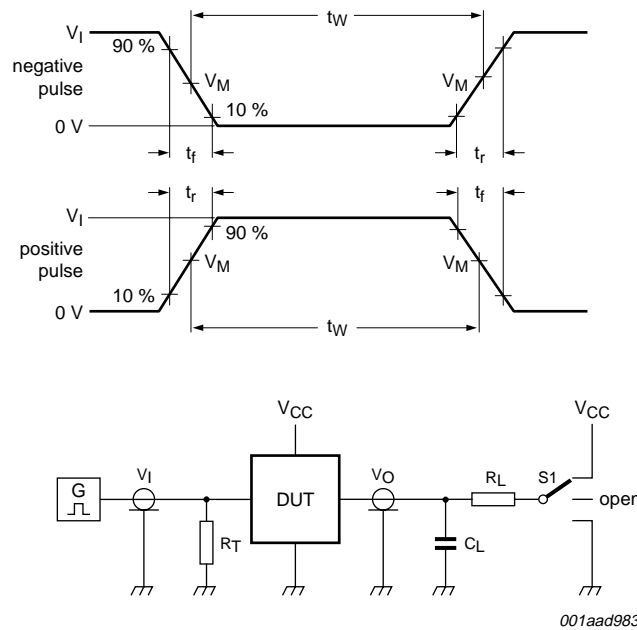
Measurement points are given in [Table 10](#).

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

**Fig 9. Enable and disable times**

**Table 10. Measurement points**

| Type      | Input       | Output      |                 |                 |
|-----------|-------------|-------------|-----------------|-----------------|
|           | $V_M$       | $V_M$       | $V_X$           | $V_Y$           |
| 74HC1G66  | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL} + 10\%$ | $V_{OH} - 10\%$ |
| 74HCT1G66 | 1.3 V       | 1.3 V       | $V_{OL} + 10\%$ | $V_{OH} - 10\%$ |



Test data is given in [Table 11](#).

Definitions for test circuit:

$R_T$  = Termination resistance should be equal to output impedance  $Z_o$  of the pulse generator.

$C_L$  = Load capacitance including jig and probe capacitance.

$R_L$  = Load resistance.

S1 = Test selection switch.

**Fig 10. Test circuit for measuring switching times**

**Table 11. Test data**

| Type      | Input           |                           | Load         |                                | S1 position        |                    |                    |
|-----------|-----------------|---------------------------|--------------|--------------------------------|--------------------|--------------------|--------------------|
|           | $V_I$           | $t_r, t_f$ <sup>[1]</sup> | $C_L$        | $R_L$                          | $t_{PHL}, t_{PLH}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ |
| 74HC1G66  | GND to $V_{CC}$ | 6 ns                      | 50 pF, 15 pF | 1 k $\Omega$ , $\infty \Omega$ | open               | GND                | $V_{CC}$           |
| 74HCT1G66 | GND to 3 V      | 6 ns                      | 50 pF, 15 pF | 1 k $\Omega$ , $\infty \Omega$ | open               | GND                | $V_{CC}$           |

[1] There is no constraint on  $t_r, t_f$  with a 50% duty factor when measuring  $f_{max}$ .

## 11.2 Additional dynamic characteristics

**Table 12. Additional dynamic characteristics for 74HC1G66 and 74HCT1G66**

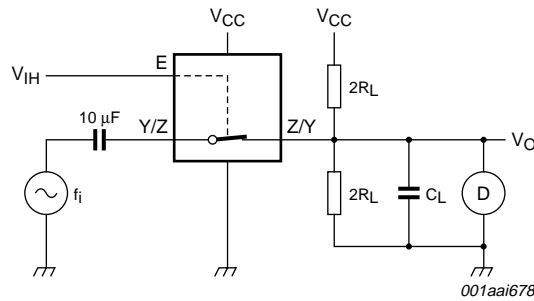
$GND = 0 V$ ;  $t_r = t_f = 6.0 ns$ ;  $C_L = 50 pF$ ; unless otherwise specified. All typical values are measured at  $T_{amb} = 25^\circ C$ .

| Symbol | Parameter                 | Conditions  | Min | Typ  | Max | Unit |   |
|--------|---------------------------|---|-----|------|-----|------|---|
| THD    | total harmonic distortion | $f_i = 1 kHz$ ; $R_L = 10 k\Omega$ ; see <a href="#">Figure 11</a>  |     |      |     | %    |   |
|        |                           | $V_{CC} = 4.5 V$ ; $V_I = 4.0 V$ (p-p)                              | -   | 0.04 | -   | %    |   |
|        |                           | $V_{CC} = 9.0 V$ ; $V_I = 8.0 V$ (p-p)                              | -   | 0.02 | -   | %    |   |
|        |                           | $f_i = 10 kHz$ ; $R_L = 10 k\Omega$ ; see <a href="#">Figure 11</a> |     |      |     |      | % |
|        |                           | $V_{CC} = 4.5 V$ ; $V_I = 4.0 V$ (p-p)                              | -   | 0.12 | -   | %    |   |
|        |                           | $V_{CC} = 9.0 V$ ; $V_I = 8.0 V$ (p-p)                              | -   | 0.06 | -   | %    |   |

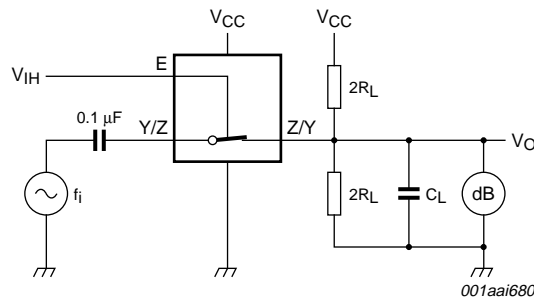
**Table 12. Additional dynamic characteristics for 74HC1G66 and 74HCT1G66 ...continued**  
*GND = 0 V;  $t_r = t_f = 6.0$  ns;  $C_L = 50$  pF; unless otherwise specified. All typical values are measured at  $T_{amb} = 25^\circ\text{C}$ .*

| Symbol                | Parameter                | Conditions   | Min | Typ | Max | Unit |
|-----------------------|--------------------------|--|-----|-----|-----|------|
| $f_{(-3\text{dB})}$   | -3 dB frequency response | $R_L = 50\ \Omega$ ; $C_L = 10\ \text{pF}$ ; see <a href="#">Figure 12</a> and <a href="#">13</a>  | -   | -   | -   | -    |
|                       |                          | $V_{CC} = 4.5\ \text{V}$   | -   | 180 | -   | MHz  |
|                       |                          | $V_{CC} = 9.0\ \text{V}$   | -   | 200 | -   | MHz  |
| $\alpha_{\text{iso}}$ | isolation (OFF-state)    | $R_L = 600\ \Omega$ ; $f_i = 1\ \text{MHz}$ ; see <a href="#">Figure 14</a> and <a href="#">15</a> | -   | -   | -   | -    |
|                       |                          | $V_{CC} = 4.5\ \text{V}$   | -   | -50 | -   | dB   |
|                       |                          | $V_{CC} = 9.0\ \text{V}$   | -   | -50 | -   | dB   |

### 11.3 Test circuits and graphs

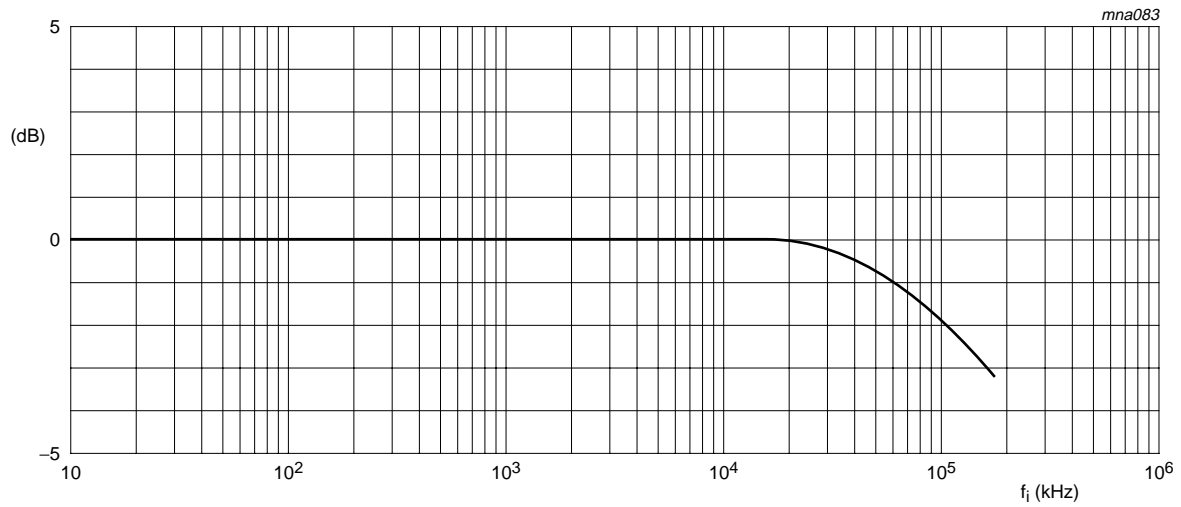


**Fig 11. Test circuit for measuring total harmonic distortion**



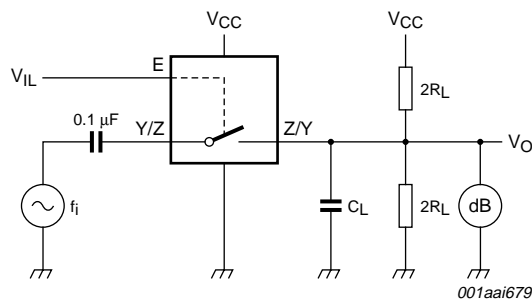
With  $f_i = 1\ \text{MHz}$  adjust the switch input voltage for a 0 dBm level at the switch output, (0 dBm = 1 mW into 50  $\Omega$ ). Then increase the input frequency until the dB meter reads -3 dB

**Fig 12. Test circuit for measuring the -3 dB frequency response**



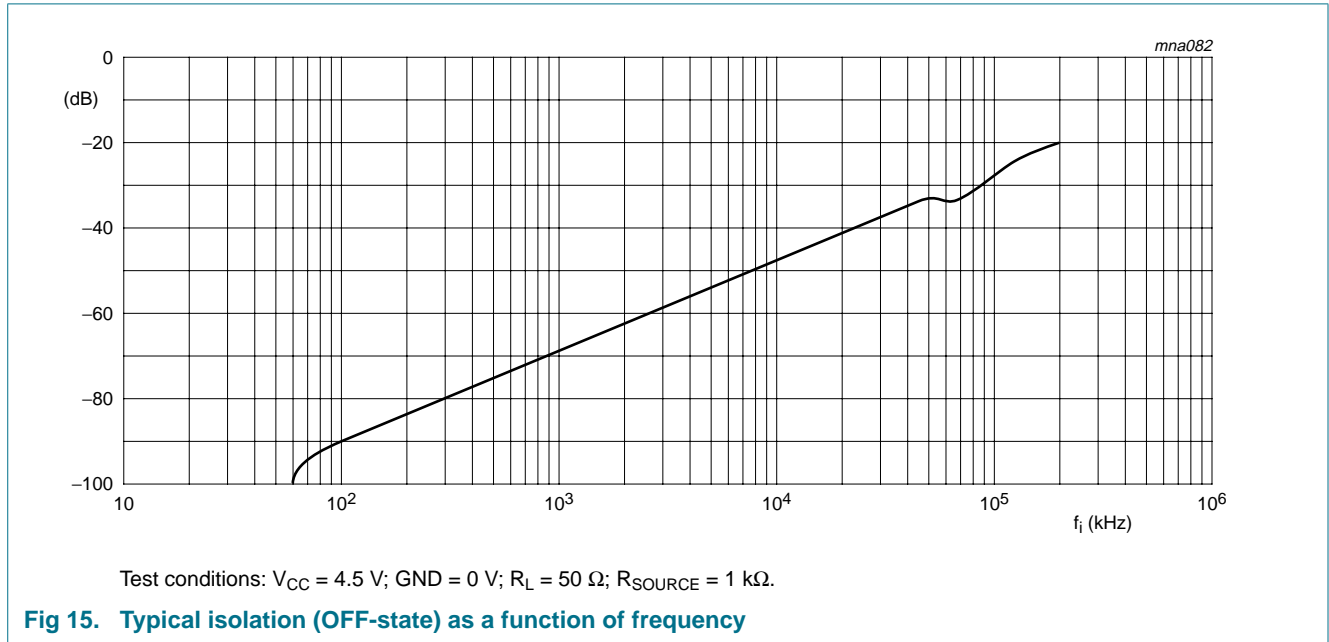
Test conditions:  $V_{CC} = 4.5\text{ V}$ ;  $GND = 0\text{ V}$ ;  $R_L = 50\ \Omega$ ;  $R_{SOURCE} = 1\text{ k}\Omega$ .

**Fig 13. Typical -3 dB frequency response**



Adjust the switch input voltage for a 0 dBm level, (0 dBm = 1 mW into 600  $\Omega$ )

**Fig 14. Test circuit for measuring isolation (OFF-state)**



12. Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm

SOT353-1

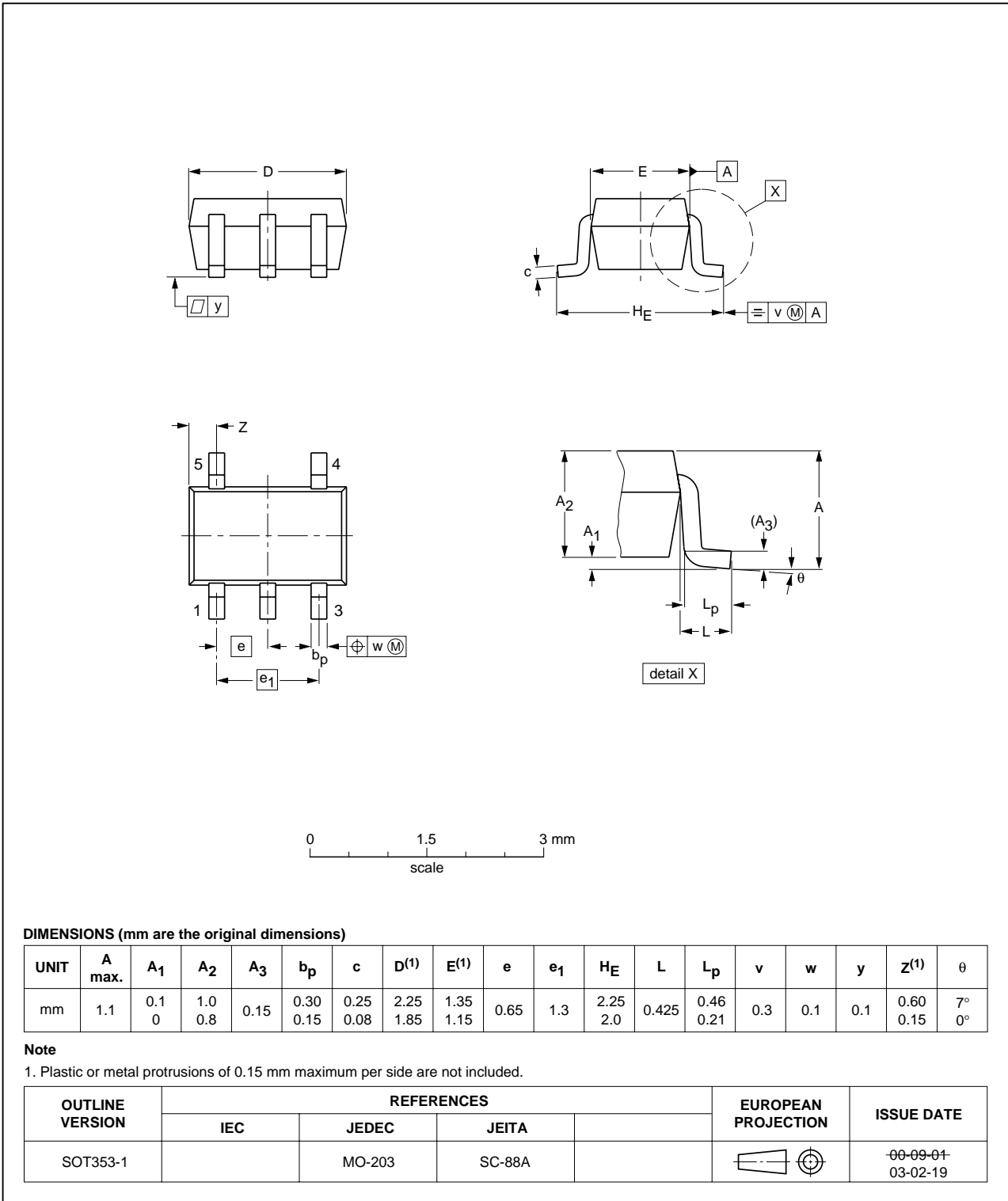


Fig 16. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753

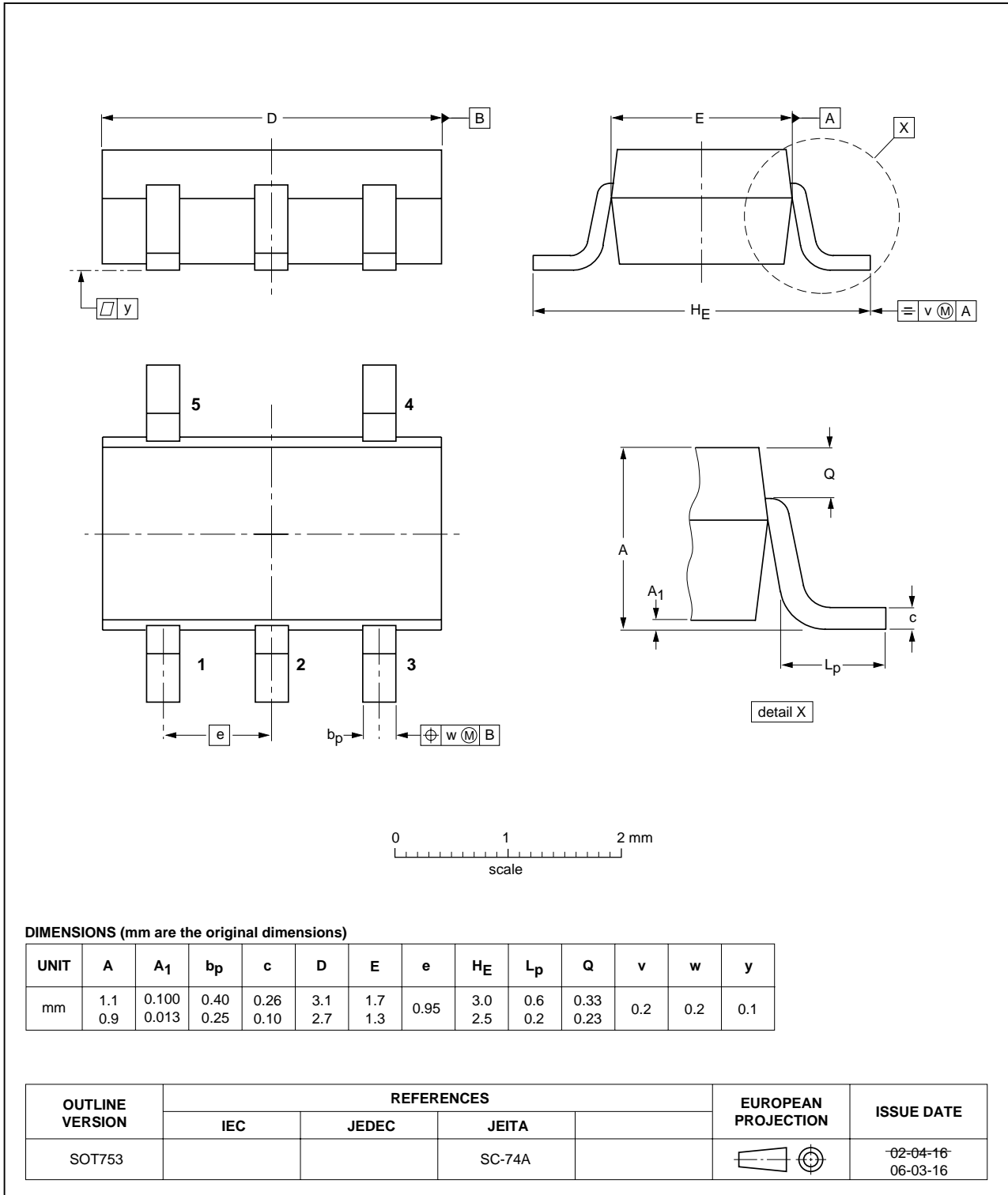


Fig 17. Package outline SOT753 (SC-74A)

## 13. Abbreviations

**Table 13. Abbreviations**

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

## 14. Revision history

**Table 14. Revision history**

| Document ID    | Release date   | Data sheet status     | Change notice | Supersedes     |
|----------------|--|-----------------------|---------------|----------------|
| 74HC_HCT1G66_4 | 20081219   | Product data sheet    | -             | 74HC_HCT1G66_3 |
| 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> <li>Package SOT353 changed to SOT353-1 in <a href="#">Table 1</a> and <a href="#">Figure 16</a>.</li> <li>Quick Reference Data and Soldering sections removed.</li> <li><a href="#">Section 2 "Features"</a> updated.</li> </ul> |                       |               |                |
| 74HC_HCT1G66_3 | 20020515   | Product specification | -             | 74HC_HCT1G66_2 |
| 74HC_HCT1G66_2 | 20010302   | Product specification | -             | 74HC_HCT1G66_1 |
| 74HC_HCT1G66_1 | 19980803   | Product specification | -             | -              |



## 15. Legal information

### 15.1 Data sheet status

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

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

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

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

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## 17. Contents

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