

# 74HC2G17; 74HCT2G17

Dual non-inverting Schmitt trigger

Rev. 01 — 6 October 2006

Product data sheet

## 1. General description

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The 74HC2G17; 74HCT2G17 is a high-speed Si-gate CMOS device.

The 74HC2G17; 74HCT2G17 provides two non-inverting Schmitt trigger buffers. They are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals.

The inputs switch at different points for positive and negative-going signals. The difference between the positive voltage  $V_{T+}$  and the negative voltage  $V_{T-}$  is defined as the input hysteresis voltage  $V_H$ .

## 2. Features

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- Wide supply voltage range from 2.0 V to 6.0 V
- Complies with JEDEC standard no. 7A
- High noise immunity
- ESD protection:
  - ◆ HBM JESD22-A114-D exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
- Low power dissipation
- Balanced propagation delays
- Unlimited input rise and fall times
- Multiple package options
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$

## 3. Applications

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- Wave and pulse shaper for highly noisy environments
- Astable multivibrators
- Monostable multivibrators

4. Ordering information

Table 1. Ordering information

| Type number | Package           |       |                                                  |         |
|-------------|-------------------|-------|--------------------------------------------------|---------|
|             | Temperature range | Name  | Description                                      | Version |
| 74HC2G17GW  | −40 °C to +125 °C | SC-88 | plastic surface-mounted package; 6 leads         | SOT363  |
| 74HC2G17GV  | −40 °C to +125 °C | SC-74 | plastic surface-mounted package (TSOP6); 6 leads | SOT457  |
| 74HCT2G17GW | −40 °C to +125 °C | SC-88 | plastic surface-mounted package; 6 leads         | SOT363  |
| 74HCT2G17GV | −40 °C to +125 °C | SC-74 | plastic surface-mounted package (TSOP6); 6 leads | SOT457  |

5. Marking

Table 2. Marking

| Type number | Marking code |
|-------------|--------------|
| 74HC2G17GW  | HV           |
| 74HC2G17GV  | HV           |
| 74HCT2G17GW | TV           |
| 74HCT2G17GV | TV           |

6. Functional diagram

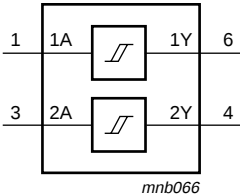


Fig 1. Logic symbol

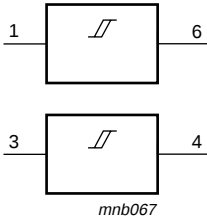


Fig 2. IEC logic symbol

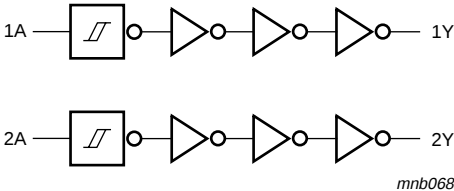


Fig 3. Logic diagram

7. Pinning information

7.1 Pinning

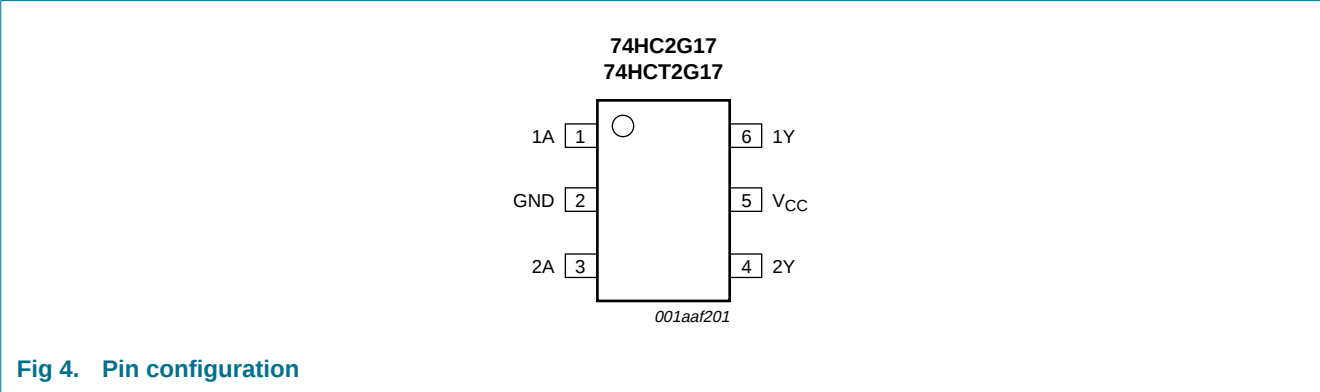


Fig 4. Pin configuration

7.2 Pin description

Table 3. Pin description

| Symbol          | Pin | Description    |
|-----------------|-----|----------------|
| 1A              | 1   | data input     |
| GND             | 2   | ground (0 V)   |
| 2A              | 3   | data input     |
| 2Y              | 4   | data output    |
| V <sub>CC</sub> | 5   | supply voltage |
| 1Y              | 6   | data output    |

8. Functional description

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

| Input | Output |
|-------|--------|
| nA    | nY     |
| L     | L      |
| H     | H      |

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

## 9. 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  | +7.0 | V    |
| $I_{IK}$  | input clamping current  | $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$ | [1] - | ±20  | mA   |
| $I_{OK}$  | output clamping current | $V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$ | [1] - | ±20  | mA   |
| $I_O$     | output current          | $V_O = -0.5\text{ V}$ to $V_{CC} + 0.5\text{ V}$       | [1] - | ±25  | mA   |
| $I_{CC}$  | supply current          |                                                        | [1] - | 50   | mA   |
| $I_{GND}$ | ground current          |                                                        | [1] - | -50  | mA   |
| $T_{stg}$ | storage temperature     |                                                        | -65   | +150 | °C   |
| $P_{tot}$ | total power dissipation |                                                        | [2] - | 250  | mW   |

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

[2] For SC-88 and SC-74 packages: above 87.5 °C the value of  $P_{tot}$  derates linearly with 4.0 mW/K.

## 10. Recommended operating conditions

**Table 6. Recommended operating conditions**

| Symbol                | Parameter           | Conditions | Min | Typ | Max      | Unit |
|-----------------------|---------------------|------------|-----|-----|----------|------|
| <b>Type 74HC2G17</b>  |                     |            |     |     |          |      |
| $V_{CC}$              | supply voltage      |            | 2.0 | 5.0 | 6.0      | V    |
| $V_I$                 | input voltage       |            | 0   | -   | $V_{CC}$ | V    |
| $V_O$                 | output voltage      |            | 0   | -   | $V_{CC}$ | V    |
| $T_{amb}$             | ambient temperature |            | -40 | +25 | +125     | °C   |
| <b>Type 74HCT2G17</b> |                     |            |     |     |          |      |
| $V_{CC}$              | supply voltage      |            | 4.5 | 5.0 | 5.5      | V    |
| $V_I$                 | input voltage       |            | 0   | -   | $V_{CC}$ | V    |
| $V_O$                 | output voltage      |            | 0   | -   | $V_{CC}$ | V    |
| $T_{amb}$             | ambient temperature |            | -40 | +25 | +125     | °C   |

## 11. Static characteristics

**Table 7. Static characteristics for 74HC2G17**

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

| Symbol                                     | Parameter                 | Conditions                                               | Min  | Typ  | Max | Unit |
|--------------------------------------------|---------------------------|----------------------------------------------------------|------|------|-----|------|
| <b><math>T_{amb} = 25\text{ °C}</math></b> |                           |                                                          |      |      |     |      |
| $V_{OH}$                                   | HIGH-level output voltage | $V_I = V_{IH}$ or $V_{IL}$                               |      |      |     |      |
|                                            |                           | $I_O = -20\text{ }\mu\text{A}$ ; $V_{CC} = 2.0\text{ V}$ | 1.9  | 2.0  | -   | V    |
|                                            |                           | $I_O = -20\text{ }\mu\text{A}$ ; $V_{CC} = 4.5\text{ V}$ | 4.4  | 4.5  | -   | V    |
|                                            |                           | $I_O = -20\text{ }\mu\text{A}$ ; $V_{CC} = 6.0\text{ V}$ | 5.9  | 6.0  | -   | V    |
|                                            |                           | $I_O = -4.0\text{ mA}$ ; $V_{CC} = 4.5\text{ V}$         | 4.18 | 4.32 | -   | V    |
|                                            |                           | $I_O = -5.2\text{ mA}$ ; $V_{CC} = 6.0\text{ V}$         | 5.68 | 5.81 | -   | V    |

**Table 7.** Static characteristics for 74HC2G17 ...continued

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

| Symbol                                                                                        | Parameter                 | Conditions                                                                | Min  | Typ  | Max       | Unit          |
|-----------------------------------------------------------------------------------------------|---------------------------|---------------------------------------------------------------------------|------|------|-----------|---------------|
| $V_{OL}$                                                                                      | LOW-level output voltage  | $V_I = V_{IH}$ or $V_{IL}$                                                |      |      |           |               |
|                                                                                               |                           | $I_O = 20\ \mu\text{A}; V_{CC} = 2.0\ \text{V}$                           | -    | 0    | 0.1       | V             |
|                                                                                               |                           | $I_O = 20\ \mu\text{A}; V_{CC} = 4.5\ \text{V}$                           | -    | 0    | 0.1       | V             |
|                                                                                               |                           | $I_O = 20\ \mu\text{A}; V_{CC} = 6.0\ \text{V}$                           | -    | 0    | 0.1       | V             |
|                                                                                               |                           | $I_O = 4.0\ \text{mA}; V_{CC} = 4.5\ \text{V}$                            | -    | 0.15 | 0.26      | V             |
|                                                                                               |                           | $I_O = 5.2\ \text{mA}; V_{CC} = 6.0\ \text{V}$                            | -    | 0.16 | 0.26      | V             |
| $I_I$                                                                                         | input leakage current     | $V_I = \text{GND}$ or $V_{CC}; V_{CC} = 6.0\ \text{V}$                    | -    | -    | $\pm 0.1$ | $\mu\text{A}$ |
| $I_{CC}$                                                                                      | supply current            | $V_I = \text{GND}$ or $V_{CC}; I_O = 0\ \text{A}; V_{CC} = 6.0\ \text{V}$ | -    | -    | 1.0       | $\mu\text{A}$ |
| $C_I$                                                                                         | input capacitance         |                                                                           | -    | 2.0  | -         | pF            |
| <b><math>T_{\text{amb}} = -40\ ^\circ\text{C}</math> to <math>+85\ ^\circ\text{C}</math></b>  |                           |                                                                           |      |      |           |               |
| $V_{OH}$                                                                                      | HIGH-level output voltage | $V_I = V_{IH}$ or $V_{IL}$                                                |      |      |           |               |
|                                                                                               |                           | $I_O = -20\ \mu\text{A}; V_{CC} = 2.0\ \text{V}$                          | 1.9  | -    | -         | V             |
|                                                                                               |                           | $I_O = -20\ \mu\text{A}; V_{CC} = 4.5\ \text{V}$                          | 4.4  | -    | -         | V             |
|                                                                                               |                           | $I_O = -20\ \mu\text{A}; V_{CC} = 6.0\ \text{V}$                          | 5.9  | -    | -         | V             |
|                                                                                               |                           | $I_O = -4.0\ \text{mA}; V_{CC} = 4.5\ \text{V}$                           | 4.13 | -    | -         | V             |
|                                                                                               |                           | $I_O = -5.2\ \text{mA}; V_{CC} = 6.0\ \text{V}$                           | 5.63 | -    | -         | V             |
| $V_{OL}$                                                                                      | LOW-level output voltage  | $V_I = V_{IH}$ or $V_{IL}$                                                |      |      |           |               |
|                                                                                               |                           | $I_O = 20\ \mu\text{A}; V_{CC} = 2.0\ \text{V}$                           | -    | -    | 0.1       | V             |
|                                                                                               |                           | $I_O = 20\ \mu\text{A}; V_{CC} = 4.5\ \text{V}$                           | -    | -    | 0.1       | V             |
|                                                                                               |                           | $I_O = 20\ \mu\text{A}; V_{CC} = 6.0\ \text{V}$                           | -    | -    | 0.1       | V             |
|                                                                                               |                           | $I_O = 4.0\ \text{mA}; V_{CC} = 4.5\ \text{V}$                            | -    | -    | 0.33      | V             |
|                                                                                               |                           | $I_O = 5.2\ \text{mA}; V_{CC} = 6.0\ \text{V}$                            | -    | -    | 0.33      | V             |
| $I_I$                                                                                         | input leakage current     | $V_I = \text{GND}$ or $V_{CC}; V_{CC} = 6.0\ \text{V}$                    | -    | -    | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{CC}$                                                                                      | supply current            | $V_I = \text{GND}$ or $V_{CC}; I_O = 0\ \text{A}; V_{CC} = 6.0\ \text{V}$ | -    | -    | 10.0      | $\mu\text{A}$ |
| <b><math>T_{\text{amb}} = -40\ ^\circ\text{C}</math> to <math>+125\ ^\circ\text{C}</math></b> |                           |                                                                           |      |      |           |               |
| $V_{OH}$                                                                                      | HIGH-level output voltage | $V_I = V_{IH}$ or $V_{IL}$                                                |      |      |           |               |
|                                                                                               |                           | $I_O = -20\ \mu\text{A}; V_{CC} = 2.0\ \text{V}$                          | 1.9  | -    | -         | V             |
|                                                                                               |                           | $I_O = -20\ \mu\text{A}; V_{CC} = 4.5\ \text{V}$                          | 4.4  | -    | -         | V             |
|                                                                                               |                           | $I_O = -20\ \mu\text{A}; V_{CC} = 6.0\ \text{V}$                          | 5.9  | -    | -         | V             |
|                                                                                               |                           | $I_O = -4.0\ \text{mA}; V_{CC} = 4.5\ \text{V}$                           | 3.7  | -    | -         | V             |
|                                                                                               |                           | $I_O = -5.2\ \text{mA}; V_{CC} = 6.0\ \text{V}$                           | 5.2  | -    | -         | V             |

**Table 7.** Static characteristics for 74HC2G17 ...continued

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

| Symbol   | Parameter                | Conditions                                                                | Min | Typ | Max       | Unit          |
|----------|--------------------------|---------------------------------------------------------------------------|-----|-----|-----------|---------------|
| $V_{OL}$ | LOW-level output voltage | $V_I = V_{IH}$ or $V_{IL}$                                                |     |     |           |               |
|          |                          | $I_O = 20\ \mu\text{A}; V_{CC} = 2.0\ \text{V}$                           | -   | -   | 0.1       | V             |
|          |                          | $I_O = 20\ \mu\text{A}; V_{CC} = 4.5\ \text{V}$                           | -   | -   | 0.1       | V             |
|          |                          | $I_O = 20\ \mu\text{A}; V_{CC} = 6.0\ \text{V}$                           | -   | -   | 0.1       | V             |
|          |                          | $I_O = 4.0\ \text{mA}; V_{CC} = 4.5\ \text{V}$                            | -   | -   | 0.4       | V             |
|          |                          | $I_O = 5.2\ \text{mA}; V_{CC} = 6.0\ \text{V}$                            | -   | -   | 0.4       | V             |
| $I_I$    | input leakage current    | $V_I = \text{GND}$ or $V_{CC}; V_{CC} = 6.0\ \text{V}$                    | -   | -   | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{CC}$ | supply current           | $V_I = \text{GND}$ or $V_{CC}; I_O = 0\ \text{A}; V_{CC} = 6.0\ \text{V}$ | -   | -   | 20.0      | $\mu\text{A}$ |

**Table 8.** Static characteristics for 74HCT2G17

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

| Symbol                                                                                       | Parameter                 | Conditions                                                                                   | Min  | Typ  | Max       | Unit          |
|----------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------|------|------|-----------|---------------|
| <b><math>T_{\text{amb}} = 25\ ^\circ\text{C}</math></b>                                      |                           |                                                                                              |      |      |           |               |
| $V_{OH}$                                                                                     | HIGH-level output voltage | $V_I = V_{IH}$ or $V_{IL}; V_{CC} = 4.5\ \text{V}$                                           |      |      |           |               |
|                                                                                              |                           | $I_O = -20\ \mu\text{A}$                                                                     | 4.4  | 4.5  | -         | V             |
|                                                                                              |                           | $I_O = -4.0\ \text{mA}$                                                                      | 4.18 | 4.32 | -         | V             |
| $V_{OL}$                                                                                     | LOW-level output voltage  | $V_I = V_{IH}$ or $V_{IL}; V_{CC} = 4.5\ \text{V}$                                           |      |      |           |               |
|                                                                                              |                           | $I_O = -20\ \mu\text{A}$                                                                     | -    | 0    | 0.1       | V             |
|                                                                                              |                           | $I_O = -4.0\ \text{mA}$                                                                      | -    | 0.15 | 0.26      | V             |
| $I_I$                                                                                        | input leakage current     | $V_I = \text{GND}$ or $V_{CC}; V_{CC} = 5.5\ \text{V}$                                       | -    | -    | $\pm 0.1$ | $\mu\text{A}$ |
| $I_{CC}$                                                                                     | supply current            | $V_I = \text{GND}$ or $V_{CC}; I_O = 0\ \text{A}; V_{CC} = 5.5\ \text{V}$                    | -    | -    | 1.0       | $\mu\text{A}$ |
| $\Delta I_{CC}$                                                                              | additional supply current | $V_I = V_{CC} - 2.1\ \text{V}; V_{CC} = 4.5\ \text{V}$ to $5.5\ \text{V}; I_O = 0\ \text{A}$ | -    | -    | 300       | $\mu\text{A}$ |
| $C_I$                                                                                        | input capacitance         |                                                                                              | -    | 2.0  | -         | pF            |
| <b><math>T_{\text{amb}} = -40\ ^\circ\text{C}</math> to <math>+85\ ^\circ\text{C}</math></b> |                           |                                                                                              |      |      |           |               |
| $V_{OH}$                                                                                     | HIGH-level output voltage | $V_I = V_{IH}$ or $V_{IL}; V_{CC} = 4.5\ \text{V}$                                           |      |      |           |               |
|                                                                                              |                           | $I_O = -20\ \mu\text{A}$                                                                     | 4.4  | -    | -         | V             |
|                                                                                              |                           | $I_O = -4.0\ \text{mA}$                                                                      | 4.13 | -    | -         | V             |
| $V_{OL}$                                                                                     | LOW-level output voltage  | $V_I = V_{IH}$ or $V_{IL}; V_{CC} = 4.5\ \text{V}$                                           |      |      |           |               |
|                                                                                              |                           | $I_O = -20\ \mu\text{A}$                                                                     | -    | -    | 0.1       | V             |
|                                                                                              |                           | $I_O = -4.0\ \text{mA}$                                                                      | -    | -    | 0.33      | V             |
| $I_I$                                                                                        | input leakage current     | $V_I = \text{GND}$ or $V_{CC}; V_{CC} = 5.5\ \text{V}$                                       | -    | -    | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{CC}$                                                                                     | supply current            | $V_I = \text{GND}$ or $V_{CC}; I_O = 0\ \text{A}; V_{CC} = 5.5\ \text{V}$                    | -    | -    | 10.0      | $\mu\text{A}$ |
| $\Delta I_{CC}$                                                                              | additional supply current | $V_I = V_{CC} - 2.1\ \text{V}; V_{CC} = 4.5\ \text{V}$ to $5.5\ \text{V}; I_O = 0\ \text{A}$ | -    | -    | 375       | $\mu\text{A}$ |

**Table 8.** Static characteristics for 74HCT2G17 ...continued

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

| Symbol                                     | Parameter                 | Conditions                                                                                          | Min | Typ | Max  | Unit |
|--------------------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------|-----|-----|------|------|
| <b>T<sub>amb</sub> = –40 °C to +125 °C</b> |                           |                                                                                                     |     |     |      |      |
| V <sub>OH</sub>                            | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V                       |     |     |      |      |
|                                            |                           | I <sub>O</sub> = –20 µA                                                                             | 4.4 | -   | -    | V    |
|                                            |                           | I <sub>O</sub> = –4.0 mA                                                                            | 3.7 | -   | -    | V    |
| V <sub>OL</sub>                            | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V                       |     |     |      |      |
|                                            |                           | I <sub>O</sub> = –20 µA                                                                             | -   | -   | 0.1  | V    |
|                                            |                           | I <sub>O</sub> = –4.0 mA                                                                            | -   | -   | 0.4  | V    |
| I <sub>I</sub>                             | input leakage current     | V <sub>I</sub> = GND or V <sub>CC</sub> ; V <sub>CC</sub> = 5.5 V                                   | -   | -   | ±1.0 | µA   |
| I <sub>CC</sub>                            | supply current            | V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A;<br>V <sub>CC</sub> = 5.5 V          | -   | -   | 20.0 | µA   |
| ΔI <sub>CC</sub>                           | additional supply current | V <sub>I</sub> = V <sub>CC</sub> – 2.1 V;<br>V <sub>CC</sub> = 4.5 V to 5.5 V; I <sub>O</sub> = 0 A | -   | -   | 410  | µA   |

## 12. Dynamic characteristics

**Table 9.** Dynamic characteristicsVoltages are referenced to GND (ground = 0 V); for test circuit see [Figure 6](#).

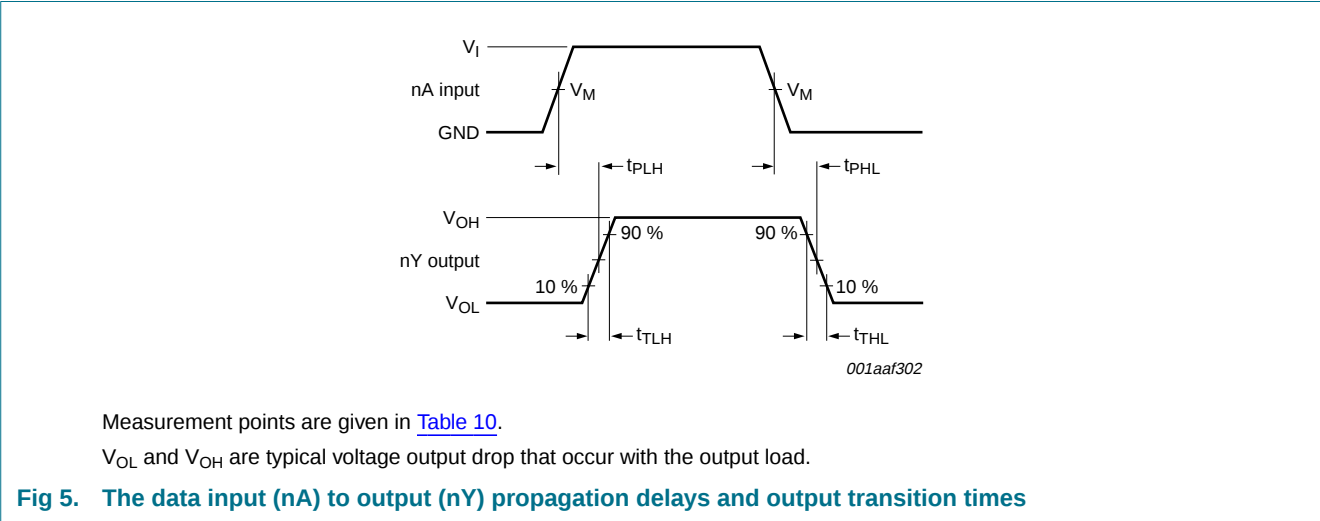
| Symbol          | Parameter                     | Conditions                                      | 25 °C               |     |     | –40 °C to +125 °C |                |                 | Unit |
|-----------------|-------------------------------|-------------------------------------------------|---------------------|-----|-----|-------------------|----------------|-----------------|------|
|                 |                               |                                                 | Min                 | Typ | Max | Min               | Max<br>(85 °C) | Max<br>(125 °C) |      |
| 74HC2G17        |                               |                                                 |                     |     |     |                   |                |                 |      |
| t <sub>pd</sub> | propagation delay             | nA to nY; see <a href="#">Figure 5</a>          | <a href="#">[1]</a> |     |     |                   |                |                 |      |
|                 |                               | V <sub>CC</sub> = 2.0 V; C <sub>L</sub> = 50 pF | -                   | 36  | 115 | -                 | 140            | 175             | ns   |
|                 |                               | V <sub>CC</sub> = 4.5 V; C <sub>L</sub> = 50 pF | -                   | 12  | 22  | -                 | 27             | 34              | ns   |
|                 |                               | V <sub>CC</sub> = 6.0 V; C <sub>L</sub> = 50 pF | -                   | 10  | 18  | -                 | 22             | 28              | ns   |
| t <sub>t</sub>  | transition time               | nY; see <a href="#">Figure 5</a>                | <a href="#">[2]</a> |     |     |                   |                |                 |      |
|                 |                               | V <sub>CC</sub> = 2.0 V; C <sub>L</sub> = 50 pF | -                   | 20  | 75  | -                 | 95             | 110             | ns   |
|                 |                               | V <sub>CC</sub> = 4.5 V; C <sub>L</sub> = 50 pF | -                   | 7   | 15  | -                 | 19             | 22              | ns   |
|                 |                               | V <sub>CC</sub> = 6.0 V; C <sub>L</sub> = 50 pF | -                   | 5   | 13  | -                 | 16             | 19              | ns   |
| C <sub>PD</sub> | power dissipation capacitance | V <sub>I</sub> = GND to V <sub>CC</sub>         | <a href="#">[3]</a> | -   | 10  | -                 | -              | -               | pF   |

**Table 9. Dynamic characteristics ...continued**  
 Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 6](#).

| Symbol          | Parameter                     | Conditions                                      | 25 °C               |     |     | –40 °C to +125 °C |                |                 | Unit |
|-----------------|-------------------------------|-------------------------------------------------|---------------------|-----|-----|-------------------|----------------|-----------------|------|
|                 |                               |                                                 | Min                 | Typ | Max | Min               | Max<br>(85 °C) | Max<br>(125 °C) |      |
| 74HCT2G17       |                               |                                                 |                     |     |     |                   |                |                 |      |
| t <sub>pd</sub> | propagation delay             | nA to nY; see <a href="#">Figure 5</a>          | <a href="#">[1]</a> |     |     |                   |                |                 |      |
|                 |                               | V <sub>CC</sub> = 4.5 V; C <sub>L</sub> = 50 pF | -                   | 21  | 29  | -                 | 36             | 45              | ns   |
| t <sub>t</sub>  | transition time               | nY; see <a href="#">Figure 5</a>                | <a href="#">[2]</a> |     |     |                   |                |                 |      |
|                 |                               | V <sub>CC</sub> = 4.5 V; C <sub>L</sub> = 50 pF | -                   | 6   | 15  | -                 | 19             | 22              | ns   |
| C <sub>PD</sub> | power dissipation capacitance | V <sub>I</sub> = GND to V <sub>CC</sub> – 1.5 V | <a href="#">[3]</a> |     |     |                   |                |                 |      |
|                 |                               |                                                 | -                   | 10  | -   | -                 | -              | -               | pF   |

- [1] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>
- [2] t<sub>t</sub> is the same as t<sub>TLH</sub> and t<sub>THL</sub>
- [3] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$  where:  
 f<sub>i</sub> = input frequency in MHz;  
 f<sub>o</sub> = output frequency in MHz;  
 C<sub>L</sub> = output load capacitance in pF;  
 V<sub>CC</sub> = supply voltage in V;  
 N = number of inputs switching;  
 $\Sigma(C_L \times V_{CC}^2 \times f_o)$  = sum of the outputs.

13. Waveforms



| Type      | Input              |                        |                                 | Output             |
|-----------|--------------------|------------------------|---------------------------------|--------------------|
|           | V <sub>M</sub>     | V <sub>I</sub>         | t <sub>r</sub> = t <sub>f</sub> | V <sub>M</sub>     |
| 74HC2G17  | 0.5V <sub>CC</sub> | GND to V <sub>CC</sub> | 6.0 ns                          | 0.5V <sub>CC</sub> |
| 74HCT2G17 | 1.3 V              | GND to 3.0 V           | 6.0 ns                          | 1.3 V              |

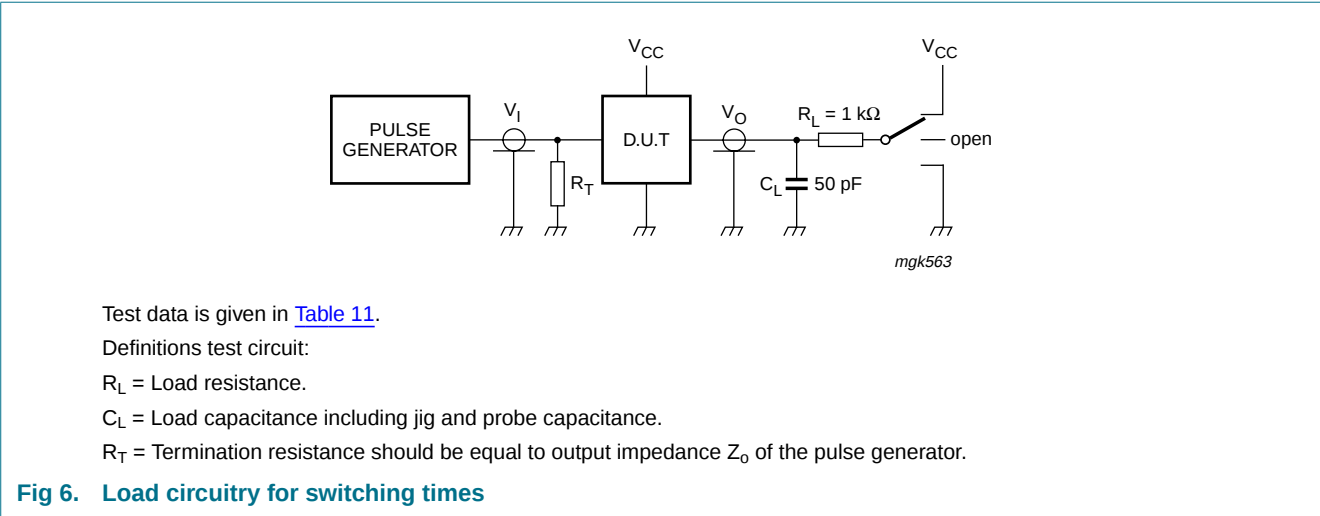


Table 11. Test data

| Type      | Input           |            | Test               |
|-----------|-----------------|------------|--------------------|
|           | $V_I$           | $t_r, t_f$ | $t_{PHL}, t_{PLH}$ |
| 74HC2G17  | GND to $V_{CC}$ | 6 ns       | open               |
| 74HCT2G17 | GND to 3.0 V    | 6 ns       | open               |

14. Transfer characteristics

Table 12. Transfer characteristics

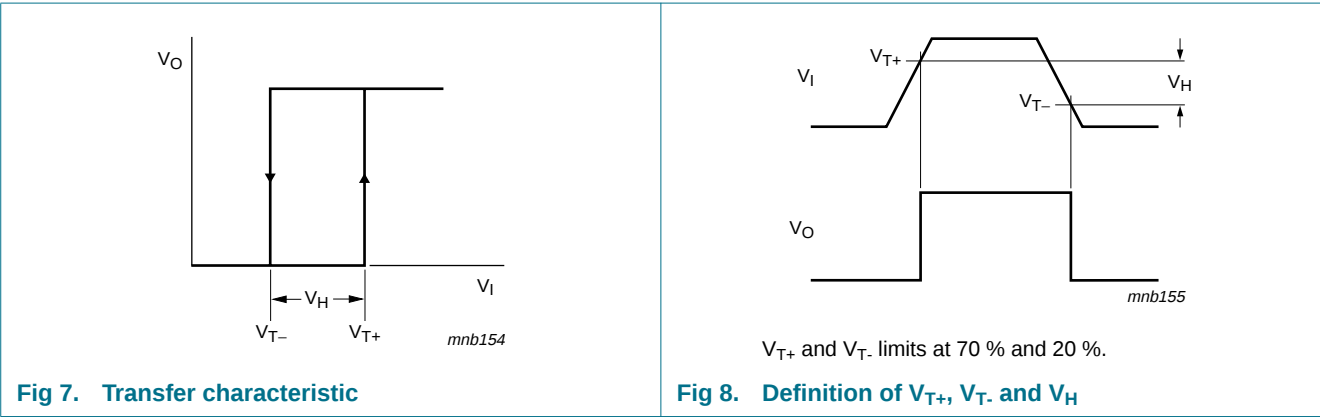
Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 6](#).

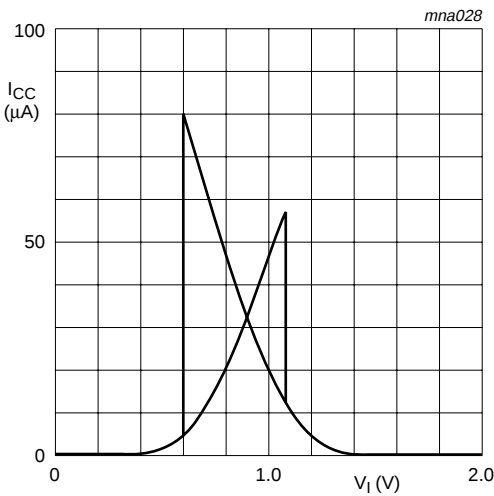
| Symbol          | Parameter                           | Conditions                                                                                                                  | 25 °C |      |      | −40 °C to +125 °C |                |                 | Unit |
|-----------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-------|------|------|-------------------|----------------|-----------------|------|
|                 |                                     |                                                                                                                             | Min   | Typ  | Max  | Min               | Max<br>(85 °C) | Max<br>(125 °C) |      |
| 74HC2G17        |                                     |                                                                                                                             |       |      |      |                   |                |                 |      |
| V <sub>T+</sub> | positive-going<br>threshold voltage | see <a href="#">Figure 7</a> , <a href="#">Figure 8</a>                                                                     |       |      |      |                   |                |                 |      |
|                 |                                     | V <sub>CC</sub> = 2.0 V                                                                                                     | 1.00  | 1.18 | 1.50 | 1.00              | 1.50           | 1.50            | V    |
|                 |                                     | V <sub>CC</sub> = 4.5 V                                                                                                     | 2.30  | 2.60 | 3.15 | 2.30              | 3.15           | 3.15            | V    |
|                 |                                     | V <sub>CC</sub> = 6.0 V                                                                                                     | 3.00  | 3.46 | 4.20 | 3.00              | 4.20           | 4.20            | V    |
| V <sub>T−</sub> | negative-going<br>threshold voltage | see <a href="#">Figure 7</a> , <a href="#">Figure 8</a>                                                                     |       |      |      |                   |                |                 |      |
|                 |                                     | V <sub>CC</sub> = 2.0 V                                                                                                     | 0.30  | 0.60 | 0.90 | 0.30              | 0.90           | 0.90            | V    |
|                 |                                     | V <sub>CC</sub> = 4.5 V                                                                                                     | 1.13  | 1.47 | 2.00 | 1.13              | 2.00           | 2.00            | V    |
|                 |                                     | V <sub>CC</sub> = 6.0 V                                                                                                     | 1.50  | 2.06 | 2.60 | 1.50              | 2.60           | 2.60            | V    |
| V <sub>H</sub>  | hysteresis voltage                  | V <sub>T+</sub> − V <sub>T−</sub> ; see <a href="#">Figure 7</a> ,<br><a href="#">Figure 8</a> and <a href="#">Figure 9</a> |       |      |      |                   |                |                 |      |
|                 |                                     | V <sub>CC</sub> = 2.0 V                                                                                                     | 0.30  | 0.60 | 1.00 | 0.30              | 1.00           | 1.00            | V    |
|                 |                                     | V <sub>CC</sub> = 4.5 V                                                                                                     | 0.60  | 1.13 | 1.40 | 0.60              | 1.40           | 1.40            | V    |
|                 |                                     | V <sub>CC</sub> = 6.0 V                                                                                                     | 0.80  | 1.40 | 1.70 | 0.80              | 1.70           | 1.70            | V    |

**Table 12. Transfer characteristics ...continued**  
 Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 6](#).

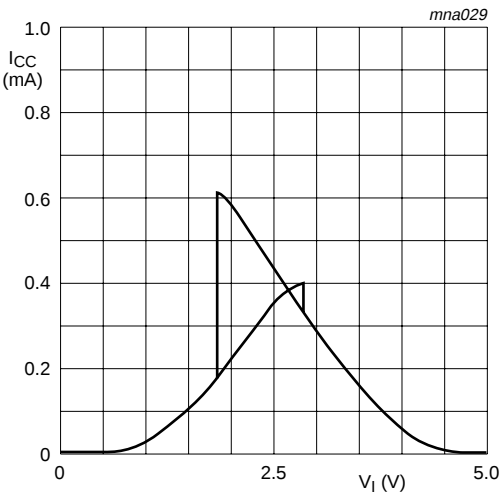
| Symbol          | Parameter                           | Conditions                                                                                                                   | 25 °C |      |      | −40 °C to +125 °C |                |                 | Unit |
|-----------------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-------|------|------|-------------------|----------------|-----------------|------|
|                 |                                     |                                                                                                                              | Min   | Typ  | Max  | Min               | Max<br>(85 °C) | Max<br>(125 °C) |      |
| 74HCT2G17       |                                     |                                                                                                                              |       |      |      |                   |                |                 |      |
| V <sub>T+</sub> | positive-going<br>threshold voltage | see <a href="#">Figure 7</a> and <a href="#">Figure 8</a>                                                                    |       |      |      |                   |                |                 |      |
|                 |                                     | V <sub>CC</sub> = 4.5 V                                                                                                      | 1.20  | 1.58 | 1.90 | 1.20              | 1.90           | 1.90            | V    |
|                 |                                     | V <sub>CC</sub> = 5.5 V                                                                                                      | 1.40  | 1.78 | 2.10 | 1.40              | 2.10           | 2.10            | V    |
| V <sub>T−</sub> | negative-going<br>threshold voltage | see <a href="#">Figure 7</a> and <a href="#">Figure 8</a>                                                                    |       |      |      |                   |                |                 |      |
|                 |                                     | V <sub>CC</sub> = 4.5 V                                                                                                      | 0.50  | 0.87 | 1.20 | 0.50              | 1.20           | 1.20            | V    |
|                 |                                     | V <sub>CC</sub> = 5.5 V                                                                                                      | 0.60  | 1.11 | 1.40 | 0.60              | 1.40           | 1.40            | V    |
| V <sub>H</sub>  | hysteresis voltage                  | V <sub>T+</sub> − V <sub>T−</sub> ; see <a href="#">Figure 7</a> ,<br><a href="#">Figure 8</a> and <a href="#">Figure 10</a> |       |      |      |                   |                |                 |      |
|                 |                                     | V <sub>CC</sub> = 4.5 V                                                                                                      | 0.40  | 0.71 | -    | 0.40              | -              | -               | V    |
|                 |                                     | V <sub>CC</sub> = 5.5 V                                                                                                      | 0.40  | 0.67 | -    | 0.40              | -              | -               | V    |

15. Waveforms transfer characteristics

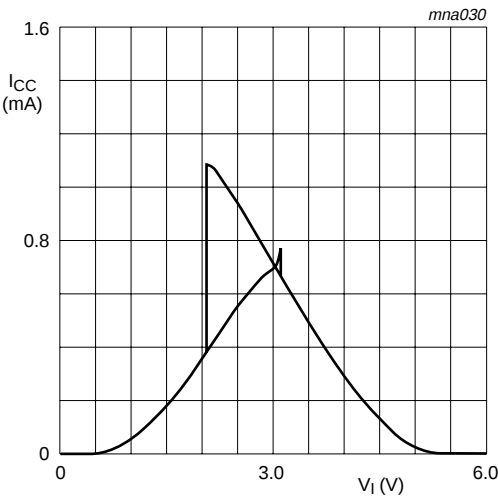




a.  $V_{CC} = 2.0 V$



b.  $V_{CC} = 4.5 V$



c.  $V_{CC} = 6.0 V$

Fig 9. Typical 74HC2G17 transfer characteristics

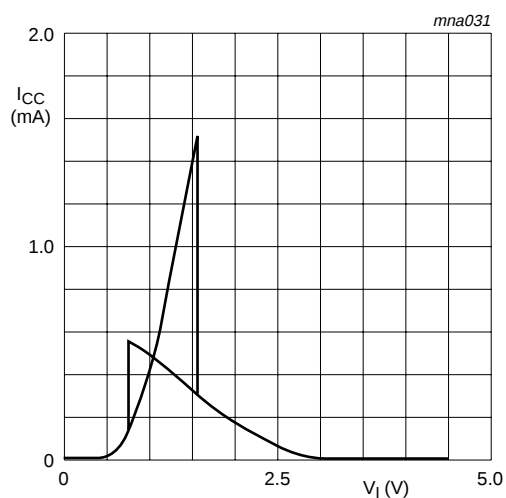
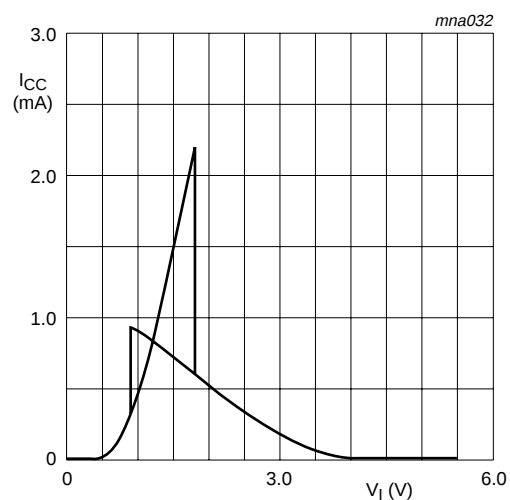
a.  $V_{CC} = 4.5$  V.b.  $V_{CC} = 5.5$  V.

Fig 10. Typical 74HCT2G17 transfer characteristics

## 16. Application information

The slow input rise and fall times cause additional power dissipation, this can be calculated using the following formula:

$$P_{add} = f_i \times (t_r \times \Delta I_{CC(AV)} + t_f \times \Delta I_{CC(AV)}) \times V_{CC} \text{ where:}$$

$P_{add}$  = additional power dissipation ( $\mu$ W);

$f_i$  = input frequency (MHz);

$t_r$  = input rise time (ns); 10 % to 90 %;

$t_f$  = input fall time (ns); 90 % to 10 %;

$\Delta I_{CC(AV)}$  = average additional supply current ( $\mu$ A).

$\Delta I_{CC(AV)}$  differs with positive or negative input transitions, as shown in [Figure 11](#) and [Figure 12](#).

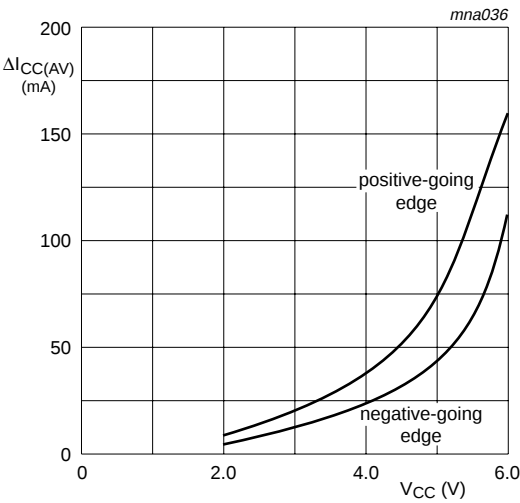


Fig 11.  $\Delta I_{CC(AV)}$  as a function of  $V_{CC}$  for 74HC2G17; linear change of  $V_I$  between  $0.1V_{CC}$  to  $0.9V_{CC}$

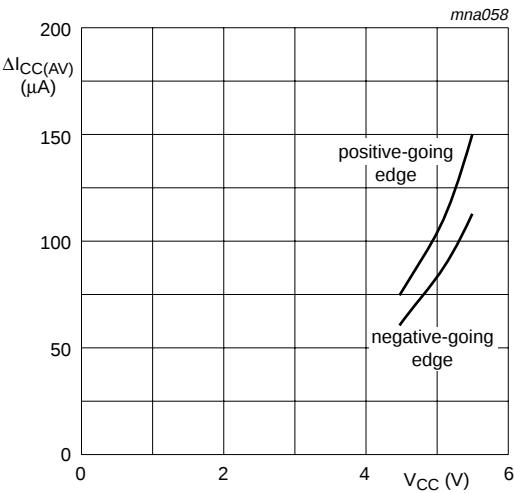


Fig 12.  $\Delta I_{CC(AV)}$  as a function of  $V_{CC}$  for 74HCT2G17; linear change of  $V_I$  between  $0.1V_{CC}$  to  $0.9V_{CC}$

17. Package outline

Plastic surface-mounted package; 6 leads

SOT363

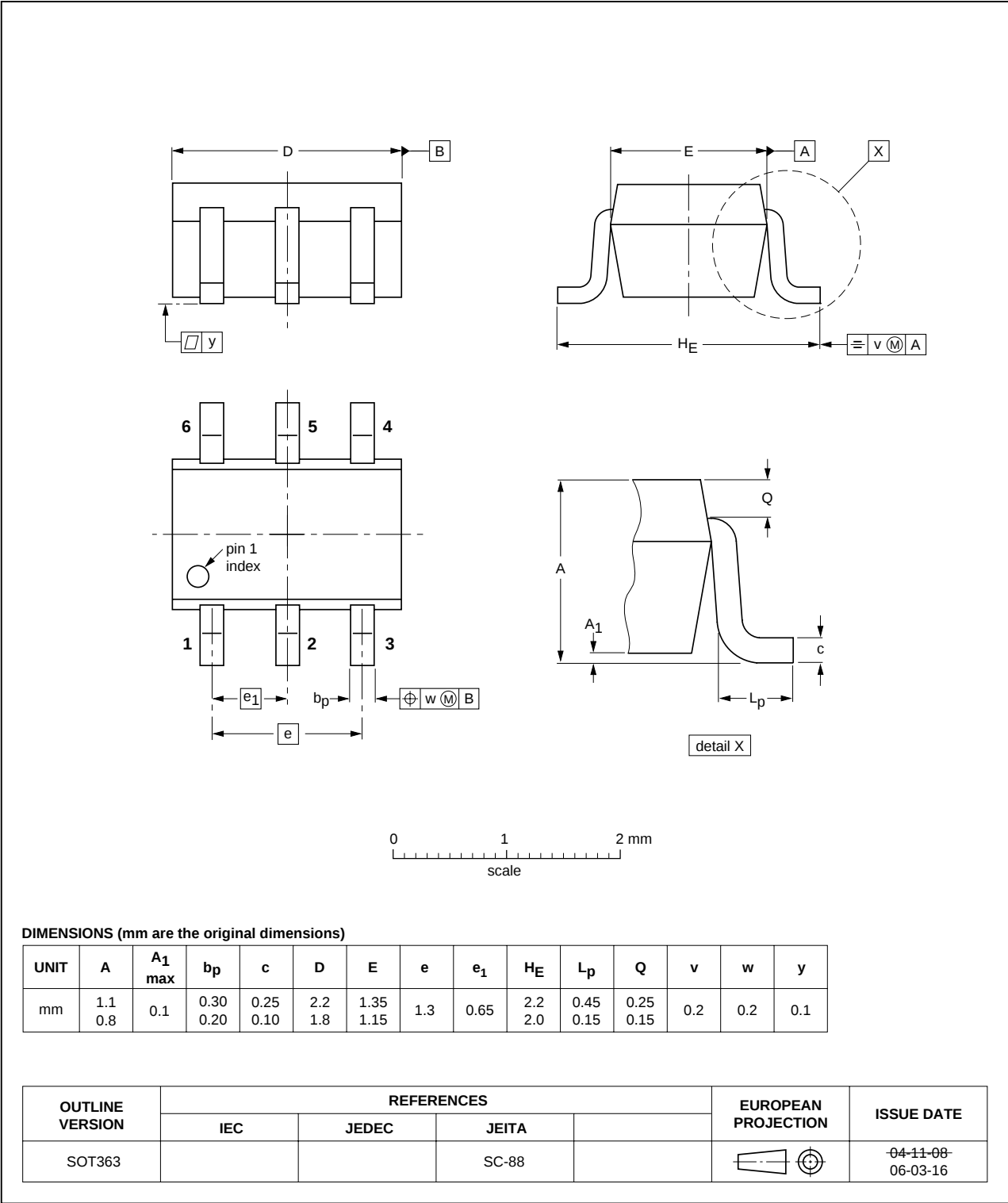


Fig 13. Package outline SOT363 (SC-88)

Plastic surface-mounted package (TSOP6); 6 leads

SOT457

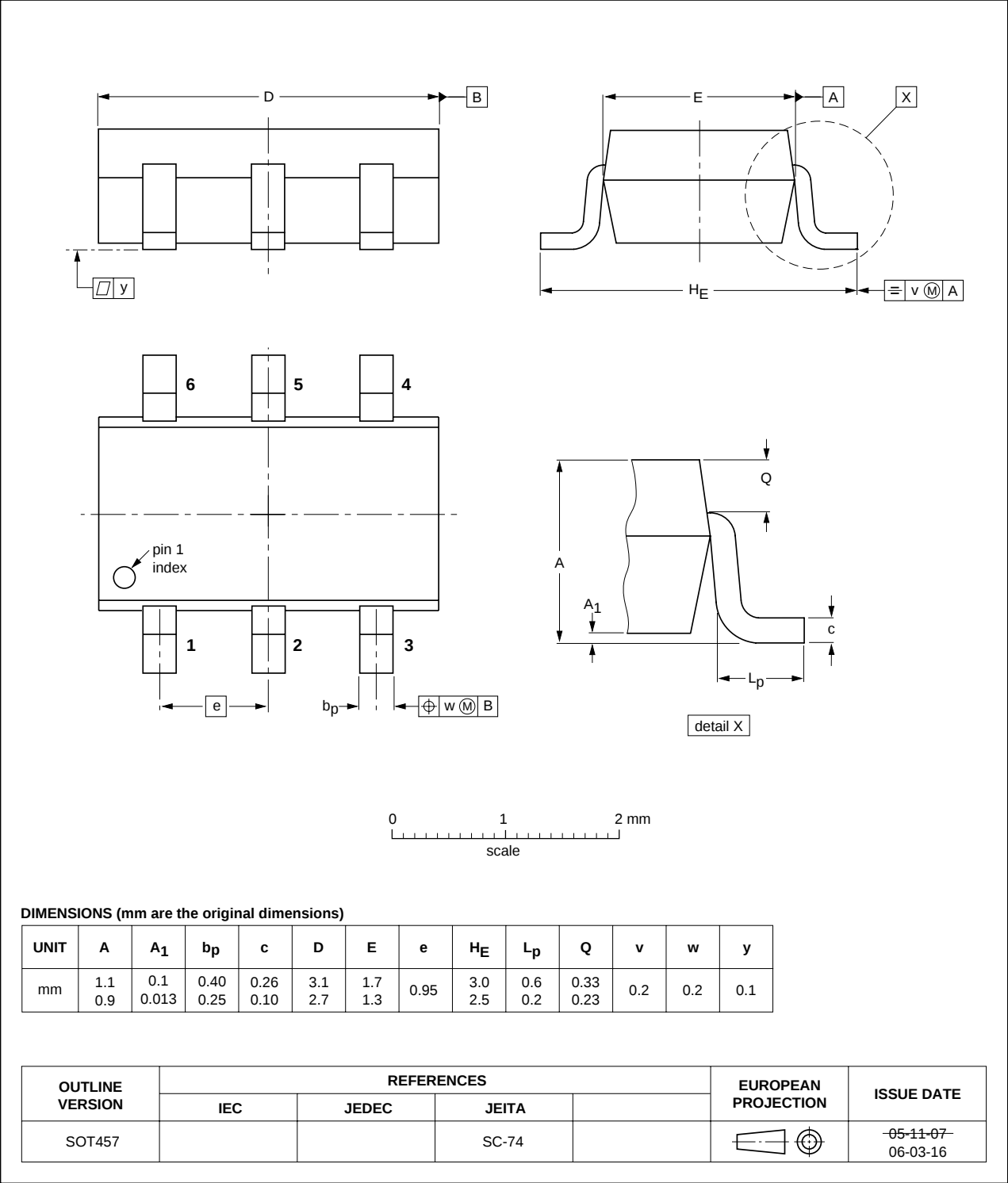


Fig 14. Package outline SOT457 (SC-74)

## 18. Abbreviations

Table 13. Abbreviations

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

## 19. Revision history

Table 14. Revision history

| Document ID    | Release date | Data sheet status  | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| 74HC_HCT2G17_1 | 20061006     | Product data sheet | -             | -          |

## 20. Legal information

### 20.1 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".

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