



74AHC1G17-Q100; 74AHCT1G17-Q100

Single Schmitt trigger buffer

Rev. 4 — 14 March 2025

Product data sheet

1. General description

The 74AHC1G17-Q100 and 74AHCT1G17-Q100 are single buffers with Schmitt-trigger inputs. Inputs are overvoltage tolerant. This feature allows the use of these devices as translators in mixed voltage environments.

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
- Wide supply voltage range from 2.0 to 5.5 V
- Overvoltage tolerant inputs to 5.5 V
- High noise immunity
- CMOS low power dissipation
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level A
- Symmetrical output impedance
- Balanced propagation delays
- Input levels:
 - For 74AHC1G17-Q100: CMOS level
 - For 74AHCT1G17-Q100: TTL level
- SOT353-1 package option
- ESD protection:
 - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
 - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V

3. Applications

- Wave and pulse shapers
- Astable multivibrators
- Monostable multivibrators

4. Ordering information

Table 1. Ordering information

| Type number | Package | | | |
|-------------------|-------------------|--------|--|---------------------------|
| | Temperature range | Name | Description | Version |
| 74AHC1G17GW-Q100 | -40 °C to +125 °C | TSSOP5 | plastic thin shrink small outline package; 5 leads; body width 1.25 mm | SOT353-1 |
| 74AHCT1G17GW-Q100 | -40 °C to +125 °C | XSON5 | plastic thermal enhanced extremely thin small outline package with side-wettable flanks (SWF); no leads; 5 terminals; body 1.1 × 0.85 × 0.5 mm | SOT8065-1 |

5. Marking

Table 2. Marking codes

| Type number | Marking code ^[1] |
|-------------------|-----------------------------|
| 74AHC1G17GW-Q100 | AJ |
| 74AHCT1G17GW-Q100 | CJ |
| 74AHC1G17GZ-Q100 | AJ |
| 74AHCT1G17GZ-Q100 | CJ |

[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

6. Functional diagram

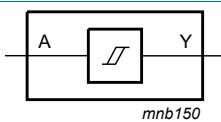


Fig. 1. Logic symbol

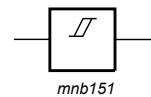


Fig. 2. IEC logic symbol

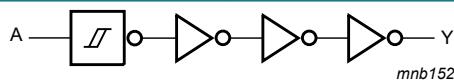
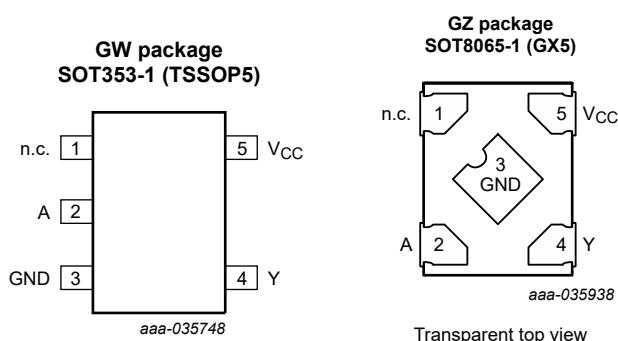


Fig. 3. Logic diagram

7. Pinning information

7.1. Pinning



7.2. Pin description

Table 3. Pin description

| Symbol | Pin | Description |
|-----------------|-----|----------------|
| n.c. | 1 | not connected |
| A | 2 | data input |
| GND | 3 | ground (0 V) |
| Y | 4 | data output |
| V _{CC} | 5 | supply voltage |

8. Functional description

Table 4. Function table

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

| Input | Output |
|-------|--------|
| A | Y |
| L | L |
| H | H |

9. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit | |
|------------------|-------------------------|---|------|------|------|----|
| V _{CC} | supply voltage | | -0.5 | +7.0 | V | |
| V _I | input voltage | | -0.5 | +7.0 | V | |
| I _{IK} | input clamping current | V _I < -0.5 V | -20 | - | mA | |
| I _{OK} | output clamping current | V _O < -0.5 V or V _O > V _{CC} + 0.5 V | [1] | - | ±20 | mA |
| I _O | output current | -0.5 V < V _O < V _{CC} + 0.5 V | - | ±25 | mA | |
| I _{CC} | supply current | | - | 75 | mA | |
| I _{GND} | ground current | | -75 | - | mA | |
| T _{stg} | storage temperature | | -65 | +150 | °C | |
| P _{tot} | total power dissipation | T _{amb} = -40 °C to +125 °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 SOT353-1 (TSSOP5) package: P_{tot} derates linearly with 3.3 mW/K above 74 °C.

For SOT8065-1 (XSON5) package: P_{tot} derates linearly with 3.2 mW/K above 72 °C.

10. Recommended operating conditions

Table 6. Recommended operating conditions

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

| Symbol | Parameter | Conditions | 74AHC1G17-Q100 | | | 74AHCT1G17-Q100 | | | Unit |
|------------------|---------------------|------------|----------------|-----|-----------------|-----------------|-----|-----------------|------|
| | | | Min | Typ | Max | Min | Typ | Max | |
| V _{CC} | supply voltage | | 2.0 | 5.0 | 5.5 | 4.5 | 5.0 | 5.5 | V |
| V _I | input voltage | | 0 | - | 5.5 | 0 | - | 5.5 | V |
| V _O | output voltage | | 0 | - | V _{CC} | 0 | - | V _{CC} | V |
| T _{amb} | ambient temperature | | -40 | +25 | +125 | -40 | +25 | +125 | °C |

11. Static characteristics

Table 7. Static characteristics

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

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|------------------------|---------------------------|--|-------|-----|------|------------------|------|-------------------|------|------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| 74AHC1G17-Q100 | | | | | | | | | | |
| V _{OH} | HIGH-level output voltage | V _I = V _{T+} or V _{T-} | | | | | | | | |
| | | I _O = -50 µA; V _{CC} = 2.0 V | 1.9 | 2.0 | - | 1.9 | - | 1.9 | - | V |
| | | I _O = -50 µA; V _{CC} = 3.0 V | 2.9 | 3.0 | - | 2.9 | - | 2.9 | - | V |
| | | I _O = -50 µA; V _{CC} = 4.5 V | 4.4 | 4.5 | - | 4.4 | - | 4.4 | - | V |
| | | I _O = -4.0 mA; V _{CC} = 3.0 V | 2.58 | - | - | 2.48 | - | 2.40 | - | V |
| | | I _O = -8.0 mA; V _{CC} = 4.5 V | 3.94 | - | - | 3.8 | - | 3.70 | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{T+} or V _{T-} | | | | | | | | |
| | | I _O = 50 µA; V _{CC} = 2.0 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 50 µA; V _{CC} = 3.0 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 50 µA; V _{CC} = 4.5 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 4.0 mA; V _{CC} = 3.0 V | - | - | 0.36 | - | 0.44 | - | 0.55 | V |
| | | I _O = 8.0 mA; V _{CC} = 4.5 V | - | - | 0.36 | - | 0.44 | - | 0.55 | V |
| I _I | input leakage current | V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V | - | - | 0.1 | - | 1.0 | - | 2.0 | µA |
| I _{CC} | supply current | V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V | - | - | 1.0 | - | 10 | - | 40 | µA |
| C _I | input capacitance | | - | 1.5 | 10 | - | 10 | - | 10 | pF |
| 74AHCT1G17-Q100 | | | | | | | | | | |
| V _{OH} | HIGH-level output voltage | V _I = V _{T+} or V _{T-} ; V _{CC} = 4.5 V | | | | | | | | |
| | | I _O = -50 µA | 4.4 | 4.5 | - | 4.4 | - | 4.4 | - | V |
| | | I _O = -8.0 mA | 3.94 | - | - | 3.8 | - | 3.70 | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{T+} or V _{T-} ; V _{CC} = 4.5 V | | | | | | | | |
| | | I _O = 50 µA | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 8.0 mA | - | - | 0.36 | - | 0.44 | - | 0.55 | V |
| I _I | input leakage current | V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V | - | - | 0.1 | - | 1.0 | - | 2.0 | µA |

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|------------------|---------------------------|--|-------|-----|------|------------------|-----|-------------------|-----|------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| I _{CC} | supply current | V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V | - | - | 1.0 | - | 10 | - | 40 | µA |
| ΔI _{CC} | additional supply current | per input pin; V _I = 3.4 V; other inputs at V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V | - | - | 1.35 | - | 1.5 | - | 1.5 | mA |
| C _I | input capacitance | | - | 1.5 | 10 | - | 10 | - | 10 | pF |

11.1. Transfer characteristics

Table 8. Transfer characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V). See Fig. 4 and Fig. 5.

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|------------------------|----------------------------------|-------------------------|-------|-----|------|------------------|------|-------------------|------|------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| 74AHC1G17-Q100 | | | | | | | | | | |
| V _{T+} | positive-going threshold voltage | V _{CC} = 3.0 V | - | - | 2.2 | - | 2.2 | - | 2.2 | V |
| | | V _{CC} = 4.5 V | - | - | 3.15 | - | 3.15 | - | 3.15 | V |
| | | V _{CC} = 5.5 V | - | - | 3.85 | - | 3.85 | - | 3.85 | V |
| V _{T-} | negative-going threshold voltage | V _{CC} = 3.0 V | 0.9 | - | - | 0.9 | - | 0.9 | - | V |
| | | V _{CC} = 4.5 V | 1.35 | - | - | 1.35 | - | 1.35 | - | V |
| | | V _{CC} = 5.5 V | 1.65 | - | - | 1.65 | - | 1.65 | - | V |
| V _H | hysteresis voltage | V _{CC} = 3.0 V | 0.3 | - | 1.2 | 0.3 | 1.2 | 0.25 | 1.2 | V |
| | | V _{CC} = 4.5 V | 0.4 | - | 1.4 | 0.4 | 1.4 | 0.35 | 1.4 | V |
| | | V _{CC} = 5.5 V | 0.5 | - | 1.6 | 0.5 | 1.6 | 0.45 | 1.6 | V |
| 74AHCT1G17-Q100 | | | | | | | | | | |
| V _{T+} | positive-going threshold voltage | V _{CC} = 4.5 V | - | - | 2.0 | - | 2.0 | - | 2.0 | V |
| | | V _{CC} = 5.5 V | - | - | 2.0 | - | 2.0 | - | 2.0 | V |
| V _{T-} | negative-going threshold voltage | V _{CC} = 4.5 V | 0.5 | - | - | 0.5 | - | 0.5 | - | V |
| | | V _{CC} = 5.5 V | 0.6 | - | - | 0.6 | - | 0.6 | - | V |
| V _H | hysteresis voltage | V _{CC} = 4.5 V | 0.4 | - | 1.4 | 0.4 | 1.4 | 0.35 | 1.4 | V |
| | | V _{CC} = 5.5 V | 0.4 | - | 1.6 | 0.4 | 1.6 | 0.35 | 1.6 | V |

11.2. Transfer characteristic waveforms

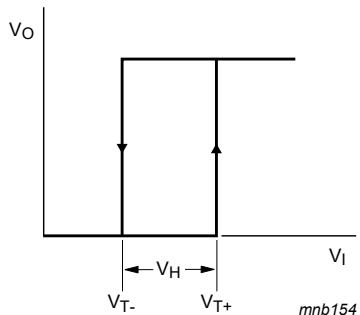


Fig. 4. Transfer characteristic

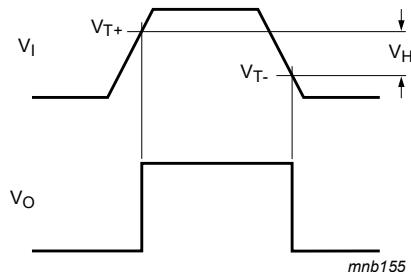


Fig. 5. The definitions of V_{T+} , V_{T-} and V_H

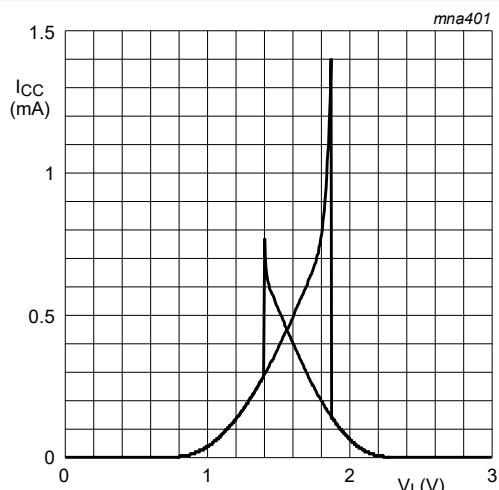


Fig. 6. Typical 74AHC1G17-Q100 transfer characteristics; $V_{CC} = 3.0$ V

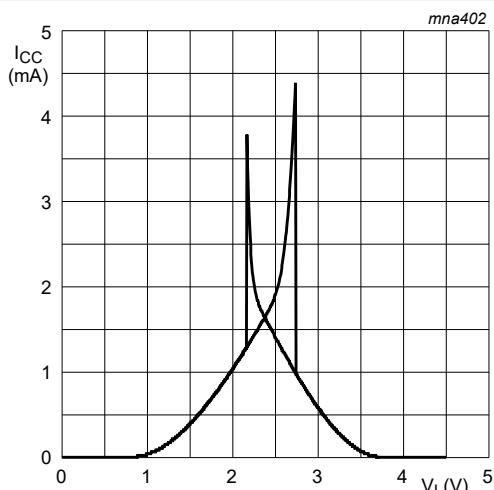


Fig. 7. Typical 74AHC1G17-Q100 transfer characteristics; $V_{CC} = 4.5$ V

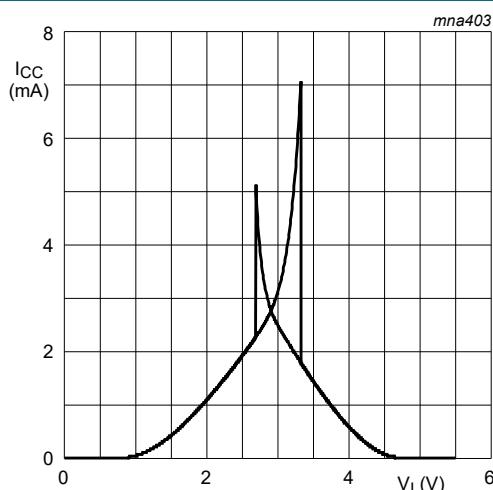


Fig. 8. Typical 74AHC1G17-Q100 transfer characteristics; $V_{CC} = 5.5$ V

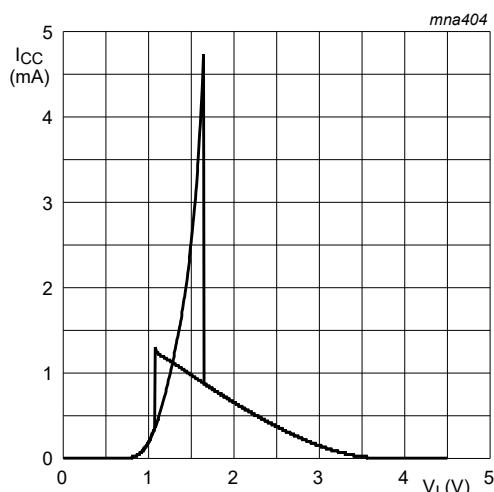


Fig. 9. Typical 74AHCT1G17-Q100 transfer characteristics; $V_{CC} = 4.5$ V

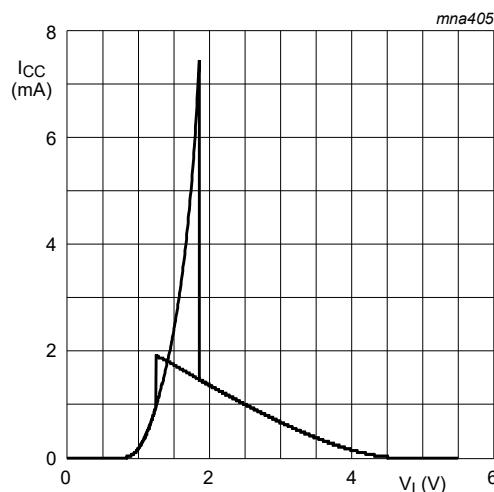


Fig. 10. Typical 74AHCT1G17-Q100 transfer characteristics; $V_{CC} = 5.5$ V

12. Dynamic characteristics

Table 9. Dynamic characteristics

$GND = 0$ V; $t_r = t_f \leq 3.0$ ns. For waveform, see Fig. 11. For test circuit, see Fig. 12.

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|------------------------|-------------------------------|---|-------|-----|------|------------------|------|-------------------|------|------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| 74AHC1G17-Q100 | | | | | | | | | | |
| t_{pd} | propagation delay | A to Y [1] | | | | | | | | |
| | | $V_{CC} = 3.0$ V to 3.6 V [2] | | | | | | | | |
| | | $C_L = 15$ pF | - | 4.2 | 12.8 | 1.0 | 15.0 | 1.0 | 16.5 | ns |
| | | $C_L = 50$ pF | - | 6.0 | 16.3 | 1.0 | 18.5 | 1.0 | 20.5 | ns |
| | | $V_{CC} = 4.5$ V to 5.5 V [3] | | | | | | | | |
| | | $C_L = 15$ pF | - | 3.2 | 8.6 | 1.0 | 10.0 | 1.0 | 11.0 | ns |
| | | $C_L = 50$ pF | - | 4.6 | 10.6 | 1.0 | 12.0 | 1.0 | 13.5 | ns |
| C_{PD} | power dissipation capacitance | per buffer; $C_L = 50$ pF; $f = 1$ MHz; $V_I = GND$ to V_{CC} [4] | - | 12 | - | - | - | - | - | pF |
| 74AHCT1G17-Q100 | | | | | | | | | | |
| t_{pd} | propagation delay | A to Y [1] | | | | | | | | |
| | | $V_{CC} = 4.5$ V to 5.5 V [3] | | | | | | | | |
| | | $C_L = 15$ pF | - | 4.1 | 7.0 | 1.0 | 8.0 | 1.0 | 9.0 | ns |
| C_{PD} | power dissipation capacitance | $C_L = 50$ pF | - | 5.9 | 8.5 | 1.0 | 10.0 | 1.0 | 11.0 | ns |
| | | per buffer; $C_L = 50$ pF; $f = 1$ MHz; $V_I = GND$ to V_{CC} [4] | - | 13 | - | - | - | - | - | pF |

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

[2] Typical values are measured at $V_{CC} = 3.3$ V.

[3] Typical values are measured at $V_{CC} = 5.0$ V.

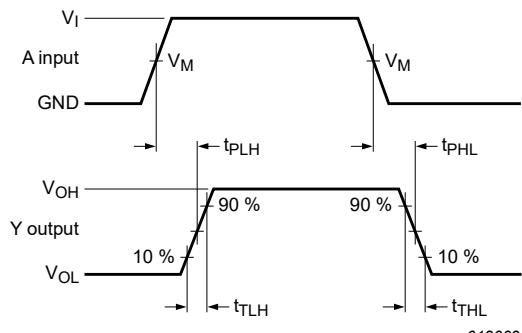
[4] C_{PD} is used to determine the dynamic power dissipation P_D (μ W).

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

f_i = input frequency in MHz; f_o = output frequency in MHz;

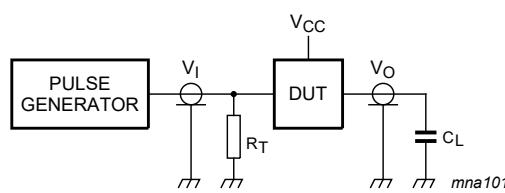
C_L = output load capacitance in pF; V_{CC} = supply voltage in V.

12.1. Waveform and test circuit



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

Fig. 11. The input (A) to output (Y) propagation delays



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

Definitions for test circuit:

C_L = Load capacitance;

R_T = Termination resistance should be equal to output impedance Z_0 of the pulse generator.

Fig. 12. Test circuit for measuring switching times

Table 10. Test data

| Type number | Input | | Output |
|-----------------|-----------------|---------------------|---------------------|
| | V_I | V_M | V_M |
| 74AHC1G17-Q100 | GND to V_{CC} | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ |
| 74AHCT1G17-Q100 | GND to 3.0 V | 1.5 V | $0.5 \times V_{CC}$ |

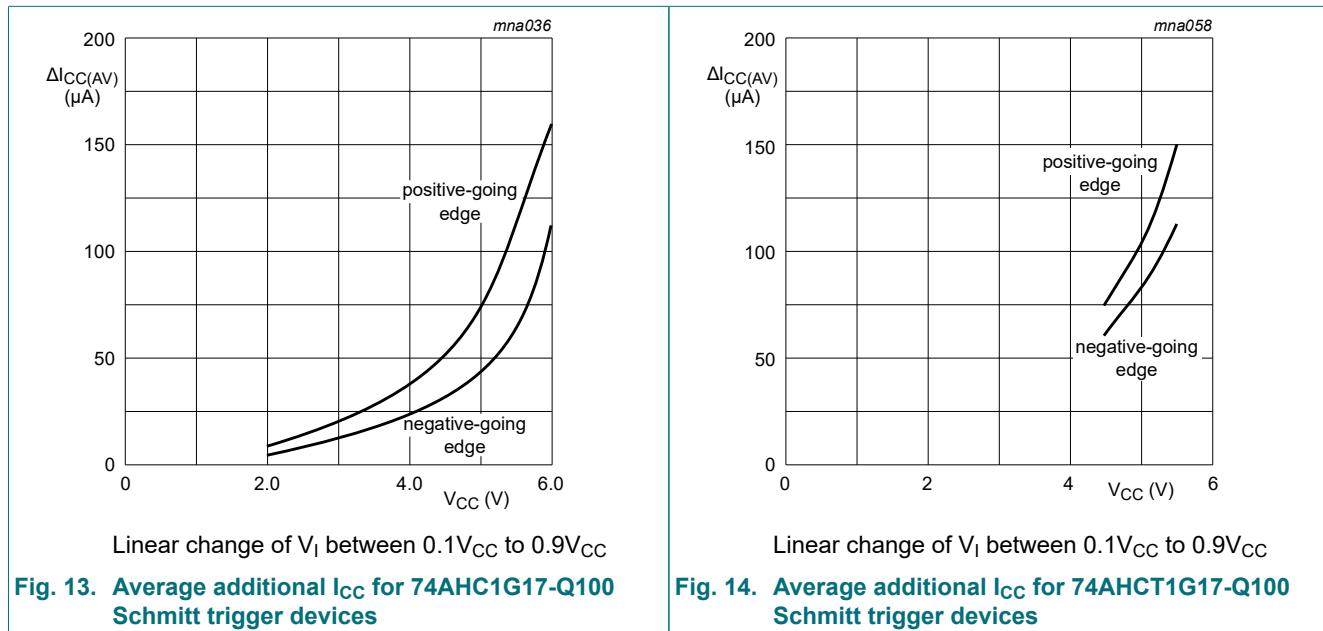
13. Application information

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

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

- P_{add} = additional power dissipation (μW);
- 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 (μA).

Average additional I_{CC} differs with positive or negative input transitions, as shown in [Fig. 13](#) and [Fig. 14](#).



14. Package outline

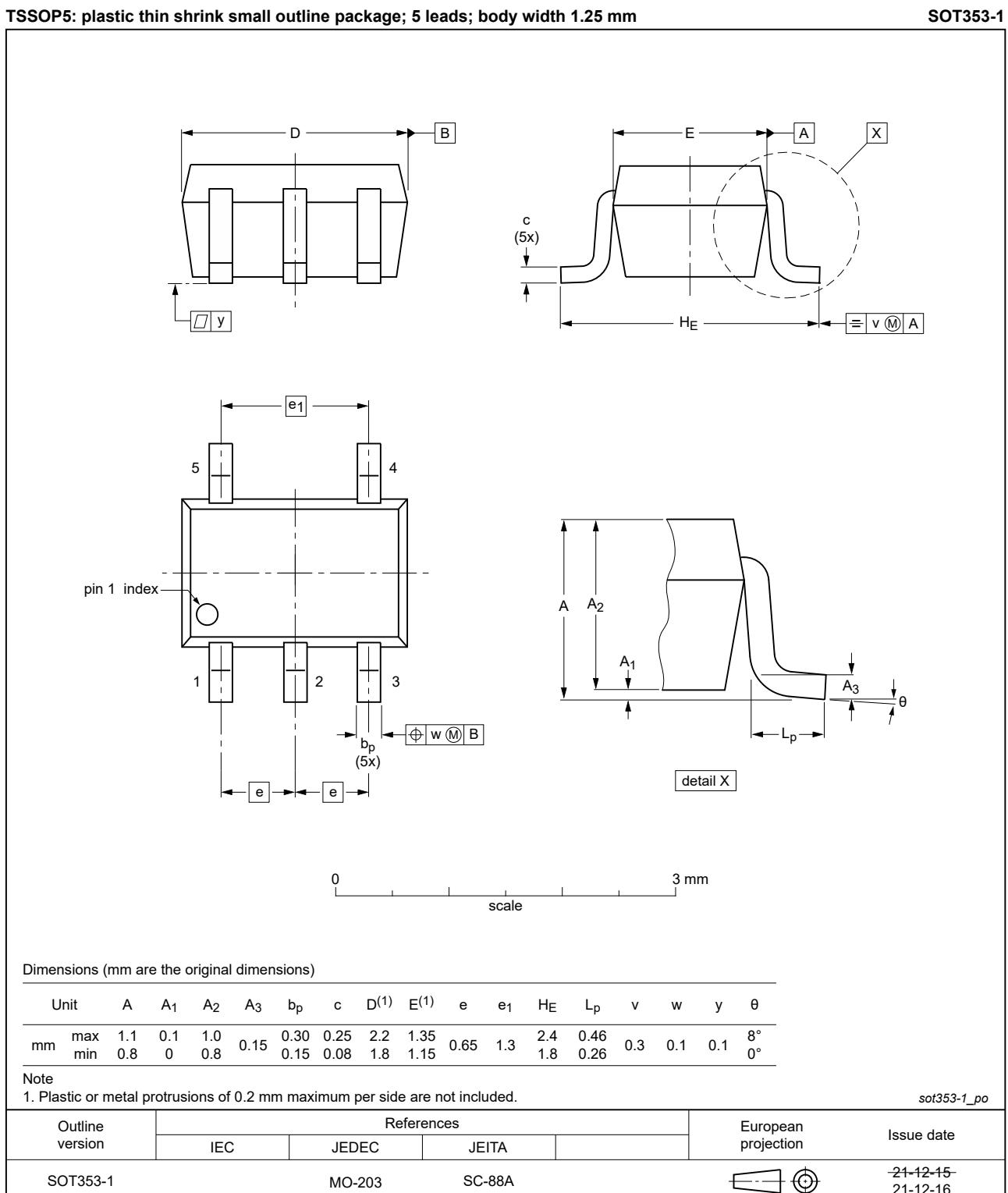


Fig. 15. Package outline SOT353-1 (TSSOP5)

XSON5: Plastic thermal enhanced extremely thin small outline package with side-wettable flanks (SWF); no leads; 5 terminals; body $1.1 \times 0.85 \times 0.5$ mm

SOT8065-1

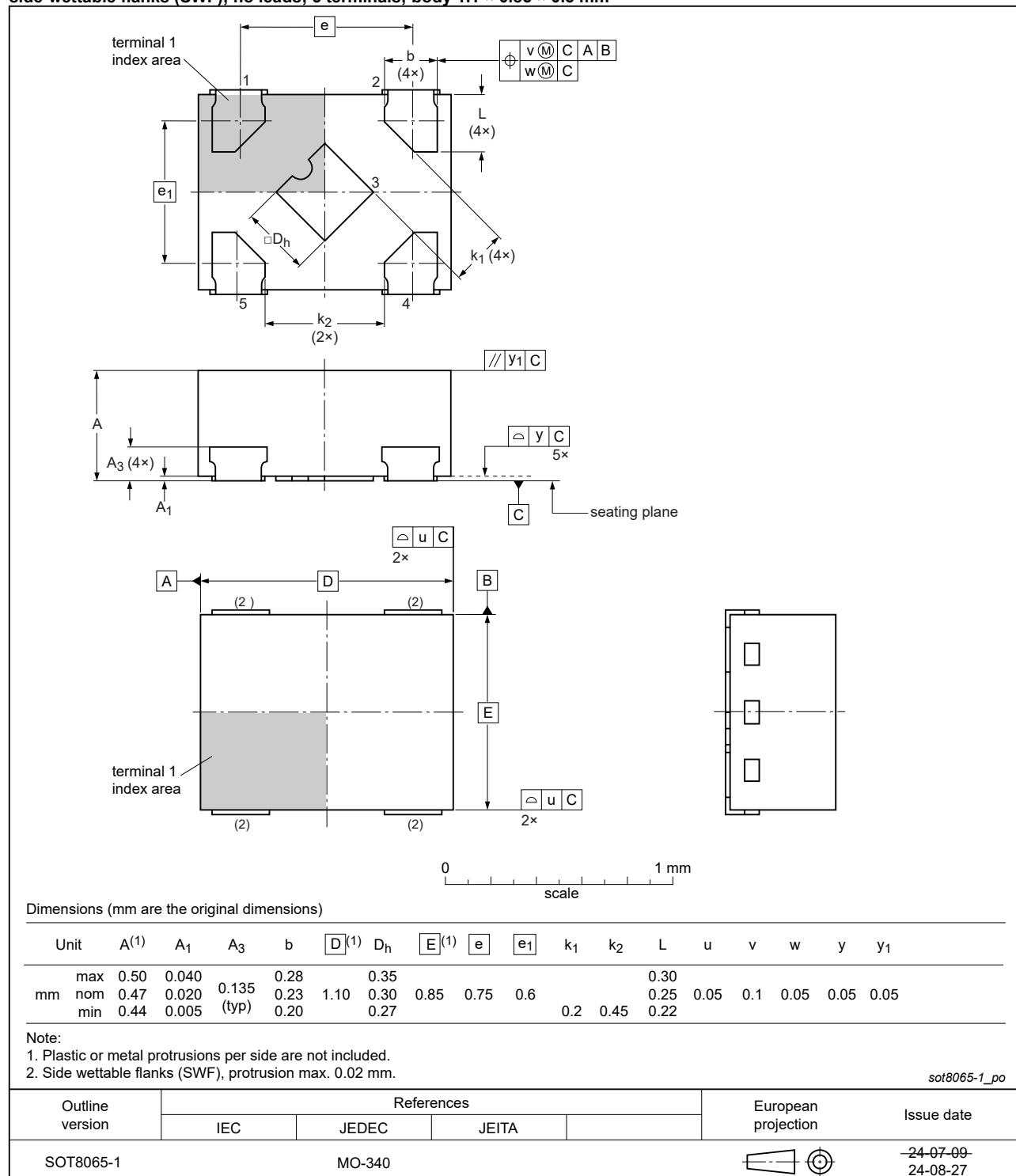


Fig. 16. Package outline SOT8065-1 (XSON5)

15. Abbreviations

Table 11. Abbreviations

| Acronym | Description |
|---------|---|
| ANSI | American National Standards Institute |
| CDM | Charged Device Model |
| CMOS | Complementary Metal-Oxide Semiconductor |
| DUT | Device Under Test |
| ESD | ElectroStatic Discharge |
| ESDA | ElectroStatic Discharge Association |
| HBM | Human Body Model |
| JEDEC | Joint Electron Device Engineering Council |
| TTL | Transistor-Transistor Logic |

16. Revision history

Table 12. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-------------------------|--------------|--------------------|---------------|--|
| 74AHC_AHCT1G17_Q100 v.4 | 20250314 | Product data sheet | - | 74AHC_AHCT1G17_Q100 v.3 |
| Modifications: | | | | <ul style="list-style-type: none"> Type numbers 74AHC1G17GZ-Q100 and 74AHCT1G17GZ-Q100 (SOT8065-1/XSON5) added. |
| 74AHC_AHCT1G17_Q100 v.3 | 20230915 | Product data sheet | - | 74AHC_AHCT1G17_Q100 v.2 |
| Modifications: | | | | <ul style="list-style-type: none"> Section 2: ESD specification updated according to the latest JEDEC standard. |
| 74AHC_AHCT1G17_Q100 v.2 | 20220112 | Product data sheet | - | 74AHC_AHCT1G17_Q100 v.1 |
| 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. Section 2 updated. Fig. 15: Package outline drawing for SOT353-1 (TSSOP5) has changed. Section 9: Derating values for P_{tot} total power dissipation updated. |
| 74AHC_AHCT1G17_Q100 v.1 | 20160308 | Product data sheet | - | - |

17. 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. |

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- [2] The term 'short data sheet' is explained in section "Definitions".
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For sales office addresses, please send an email to: salesaddresses@nexperia.com

Date of release: 14 March 2025
