# 74HC1G00-Q100; 74HCT1G00-Q100

## 2-input NAND gate

Rev. 4 — 14 March 2025 Product data sheet

## 1. General description

The 74HC1G00-Q100; 74HCT1G00-Q100 is a single 2-input NAND gate. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of $V_{CC}$.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

## 2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Wide supply voltage range from 2.0 V to 6.0 V
- CMOS low power dissipation
- Input levels:
  - For 74HC1G00-Q100: CMOS level
  - For 74HCT1G00-Q100: TTL level
- Symmetrical output impedance
- High noise immunity
- Balanced propagation delays
- Latch-up performance exceeds 100 mA per JESD78 Class II Level B
- Complies with JEDEC standards:
  - JESD8C (2.7 V to 3.6 V)
  - JESD7A (2.0 V to 6.0 V)
- 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. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74HC1G00GW-Q100<br>74HCT1G00GW-Q100 | -40 °C to +125 °C | TSSOP5 | plastic thin shrink small outline package; 5 leads; body width 1.25 mm | SOT353-1 |
| 74HC1G00GV-Q100<br>74HCT1G00GV-Q100 | -40 °C to +125 °C | SC-74A | plastic surface-mounted package; 5 leads | SOT753 |
| 74HC1G00GZ-Q100<br>74HCT1G00GZ-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 |

# 4. Marking

**Table 2. Marking codes**

| Type number | Marking [1] |
|---|---|
| 74HC1G00GW-Q100 | HA |
| 74HCT1G00GW-Q100 | TA |
| 74HC1G00GV-Q100 | H00 |
| 74HCT1G00GV-Q100 | T00 |
| 74HC1G00GZ-Q100 | HA |
| 74HCT1G00GZ-Q100 | TA |

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

# 5. Functional diagram

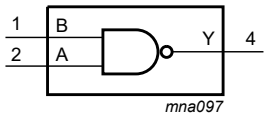



**Fig. 1. Logic symbol**

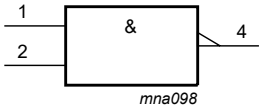



**Fig. 2. IEC logic symbol**

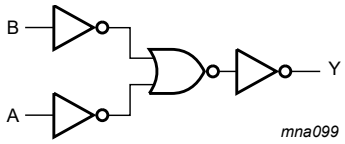
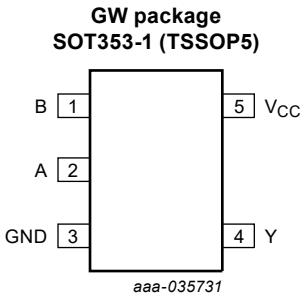
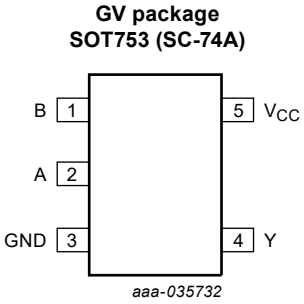


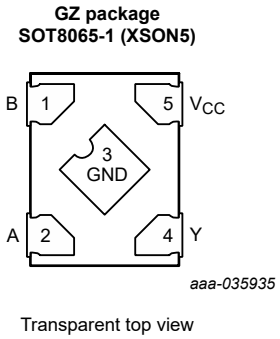

**Fig. 3. Logic diagram**

# 6. Pinning information

## 6.1. Pinning




Transparent top view

## 6.2. Pin description

**Table 3. Pin description**

| Symbol | Pin | Description |
|---|---|---|
| B | 1 | data input |
| A | 2 | data input |
| GND | 3 | ground (0 V) |
| Y | 4 | data output |
| $V_{CC}$ | 5 | supply voltage |

# 7. Functional description

**Table 4. Function table**

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

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

# 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 | +7.0 | V |
| $I_{IK}$ | input clamping current | $V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V | [1] | - | ±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 | [1] | - | ±12.5 | mA |
| $I_{CC}$ | supply current | | | - | 25 | mA |
| $I_{GND}$ | ground current | | | -25 | - | 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 SOT753 (SC-74A) package: $P_{tot}$ derates linearly with 3.8 mW/K above 85 °C.
For SOT8065-1 (XSON5) package: $P_{tot}$ derates linearly with 3.2 mW/K above 72 °C.

# 9. Recommended operating conditions

**Table 6. Recommended operating conditions**

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

| Symbol | Parameter | Conditions | 74HC1G00-Q100 | | | 74HCT1G00-Q100 | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Typ | Max | |
| $V_{CC}$ | supply voltage | | 2.0 | 5.0 | 6.0 | 4.5 | 5.0 | 5.5 | V |
| $V_I$ | input voltage | | 0 | - | $V_{CC}$ | 0 | - | $V_{CC}$ | V |
| $V_O$ | output voltage | | 0 | - | $V_{CC}$ | 0 | - | $V_{CC}$ | V |
| $T_{amb}$ | ambient temperature | | -40 | +25 | +125 | -40 | +25 | +125 | °C |
| Δt/ΔV | input transition rise and fall rate | $V_{CC}$ = 2.0 V | - | - | 625 | - | - | - | ns/V |
| | | $V_{CC}$ = 4.5 V | - | - | 139 | - | - | 139 | ns/V |
| | | $V_{CC}$ = 6.0 V | - | - | 83 | - | - | - | ns/V |

# 10. Static characteristics

**Table 7. Static characteristics**

*Voltages are referenced to GND (ground = 0 V). All typical values are measured at $T_{amb}$ = 25 °C.*

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | |
| **74HC1G00-Q100** | | | | | | | | |
| $V_{IH}$ | HIGH-level input voltage | $V_{CC}$ = 2.0 V | 1.5 | 1.2 | - | 1.5 | - | V |
| | | $V_{CC}$ = 4.5 V | 3.15 | 2.4 | - | 3.15 | - | V |
| | | $V_{CC}$ = 6.0 V | 4.2 | 3.2 | - | 4.2 | - | V |
| $V_{IL}$ | LOW-level input voltage | $V_{CC}$ = 2.0 V | - | 0.8 | 0.5 | - | 0.5 | V |
| | | $V_{CC}$ = 4.5 V | - | 2.1 | 1.35 | - | 1.35 | V |
| | | $V_{CC}$ = 6.0 V | - | 2.8 | 1.8 | - | 1.8 | V |
| $V_{OH}$ | HIGH-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ | | | | | | |
| | | $I_O$ = -20 µA; $V_{CC}$ = 2.0 V | 1.9 | 2.0 | - | 1.9 | - | V |
| | | $I_O$ = -20 µA; $V_{CC}$ = 4.5 V | 4.4 | 4.5 | - | 4.4 | - | V |
| | | $I_O$ = -20 µA; $V_{CC}$ = 6.0 V | 5.9 | 6.0 | - | 5.9 | - | V |
| | | $I_O$ = -2.0 mA; $V_{CC}$ = 4.5 V | 4.13 | 4.32 | - | 3.7 | - | V |
| | | $I_O$ = -2.6 mA; $V_{CC}$ = 6.0 V | 5.63 | 5.81 | - | 5.2 | - | V |
| $V_{OL}$ | LOW-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ | | | | | | |
| | | $I_O$ = 20 µA; $V_{CC}$ = 2.0 V | - | 0 | 0.1 | - | 0.1 | V |
| | | $I_O$ = 20 µA; $V_{CC}$ = 4.5 V | - | 0 | 0.1 | - | 0.1 | V |
| | | $I_O$ = 20 µA; $V_{CC}$ = 6.0 V | - | 0 | 0.1 | - | 0.1 | V |
| | | $I_O$ = 2.0 mA; $V_{CC}$ = 4.5 V | - | 0.15 | 0.33 | - | 0.4 | V |
| | | $I_O$ = 2.6 mA; $V_{CC}$ = 6.0 V | - | 0.16 | 0.33 | - | 0.4 | V |
| $I_I$ | input leakage current | $V_I$ = $V_{CC}$ or GND; $V_{CC}$ = 6.0 V | - | - | 1.0 | - | 1.0 | µA |
| $I_{CC}$ | supply current | $V_I$ = $V_{CC}$ or GND; $I_O$ = 0 A; $V_{CC}$ = 6.0 V | - | - | 10 | - | 20 | µA |
| $C_I$ | input capacitance | | - | 1.5 | - | - | - | pF |
| **74HCT1G00-Q100** | | | | | | | | |
| $V_{IH}$ | HIGH-level input voltage | $V_{CC}$ = 4.5 V to 5.5 V | 2.0 | 1.6 | - | 2.0 | - | V |
| $V_{IL}$ | LOW-level input voltage | $V_{CC}$ = 4.5 V to 5.5 V | - | 1.2 | 0.8 | - | 0.8 | V |
| $V_{OH}$ | HIGH-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ | | | | | | |
| | | $I_O$ = -20 µA; $V_{CC}$ = 4.5 V | 4.4 | 4.5 | - | 4.4 | - | V |
| | | $I_O$ = -2.0 mA; $V_{CC}$ = 4.5 V | 4.13 | 4.32 | - | 3.7 | - | V |
| $V_{OL}$ | LOW-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ | | | | | | |
| | | $I_O$ = 20 µA; $V_{CC}$ = 4.5 V | - | 0 | 0.1 | - | 0.1 | V |
| | | $I_O$ = 2.0 mA; $V_{CC}$ = 4.5 V | - | 0.15 | 0.33 | - | 0.4 | V |
| $I_I$ | input leakage current | $V_I$ = $V_{CC}$ or GND; $V_{CC}$ = 5.5 V | - | - | 1.0 | - | 1.0 | µA |
| $I_{CC}$ | supply current | $V_I$ = $V_{CC}$ or GND; $I_O$ = 0 A; $V_{CC}$ = 5.5 V | - | - | 10 | - | 20 | µA |
| $\Delta I_{CC}$ | additional supply current | per input; $V_{CC}$ = 4.5 V to 5.5 V; $V_I$ = $V_{CC}$ - 2.1 V; $I_O$ = 0 A | - | - | 500 | - | 850 | µA |
| $C_I$ | input capacitance | | - | 1.5 | - | - | - | pF |

# 11. Dynamic characteristics

**Table 8. Dynamic characteristics**

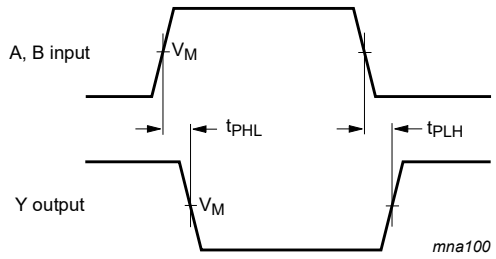
*GND = 0 V; $t_r = t_f \leq 6.0$ ns; All typical values are measured at $T_{amb}$ = 25 °C. For test circuit, see Fig. 5*

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | |
| **74HC1G00-Q100** | | | | | | | | |
| $t_{pd}$ | propagation delay | A and B to Y; see Fig. 4 [1] | | | | | | |
| | | $V_{CC}$ = 2.0 V; $C_L$ = 50 pF | - | 25 | 115 | - | 135 | ns |
| | | $V_{CC}$ = 4.5 V; $C_L$ = 50 pF | - | 9 | 23 | - | 27 | ns |
| | | $V_{CC}$ = 5.0 V; $C_L$ = 15 pF | - | 7 | - | - | - | ns |
| | | $V_{CC}$ = 6.0 V; $C_L$ = 50 pF | - | 8 | 20 | - | 23 | ns |
| $C_{PD}$ | power dissipation capacitance | $V_I$ = GND to $V_{CC}$ [2] | - | 19 | - | - | - | pF |
| **74HCT1G00-Q100** | | | | | | | | |
| $t_{pd}$ | propagation delay | A and B to Y; see Fig. 4 [1] | | | | | | |
| | | $V_{CC}$ = 4.5 V; $C_L$ = 50 pF | - | 12 | 24 | - | 27 | ns |
| | | $V_{CC}$ = 5.0 V; $C_L$ = 15 pF | - | 10 | - | - | - | ns |
| $C_{PD}$ | power dissipation capacitance | $V_I$ = GND to $V_{CC}$ - 1.5 V [2] | - | 21 | - | - | - | pF |

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

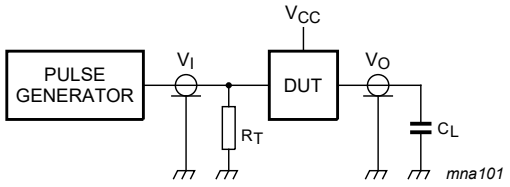
[2] $C_{PD}$ is used to determine the dynamic power dissipation $P_D$ (µW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i + \Sigma(C_L \times V_{CC}^2 \times f_o)$ where:
$f_i$ = input frequency in MHz; $f_o$ = output frequency in MHz
$C_L$ = output load capacitance in pF
$V_{CC}$ = supply voltage in V
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs

## 11.1. Waveforms and test circuit




For 74HC1G00-Q100:
$V_M = 0.5V_{CC}$; $V_I$ = GND to $V_{CC}$
For 74HCT1G00-Q100:
$V_M$ = 1.3 V; $V_I$ = GND to 3.0 V

**Fig. 4. Input to output propagation delays**

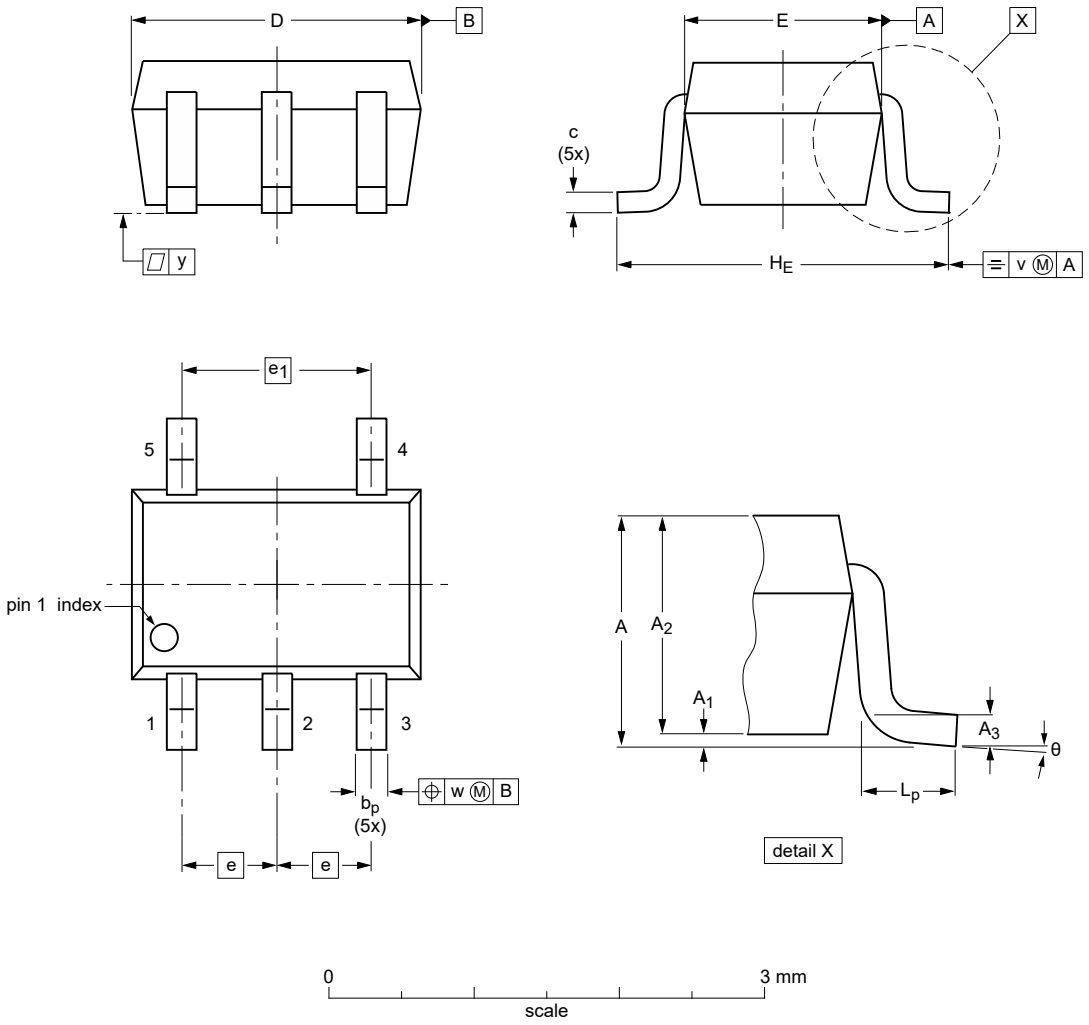



Test data is given in Table 8.
$C_L$ = Load capacitance including jig and probe capacitance;
$R_T$ = Termination resistance should be equal to output impedance $Z_o$ of the pulse generator.

**Fig. 5. Test circuit for measuring switching times**

# 12. Package outline

**TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm** **SOT353-1**




Dimensions (mm are the original dimensions)

| Unit | | A | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | $D^{(1)}$ | $E^{(1)}$ | e | $e_1$ | $H_E$ | $L_p$ | v | w | y | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 1.1 | 0.1 | 1.0 | 0.15 | 0.30 | 0.25 | 2.2 | 1.35 | 0.65 | 1.3 | 2.4 | 0.46 | 0.3 | 0.1 | 0.1 | 8° |
| | min | 0.8 | 0 | 0.8 | | 0.15 | 0.08 | 1.8 | 1.15 | | | 1.8 | 0.26 | | | | 0° |

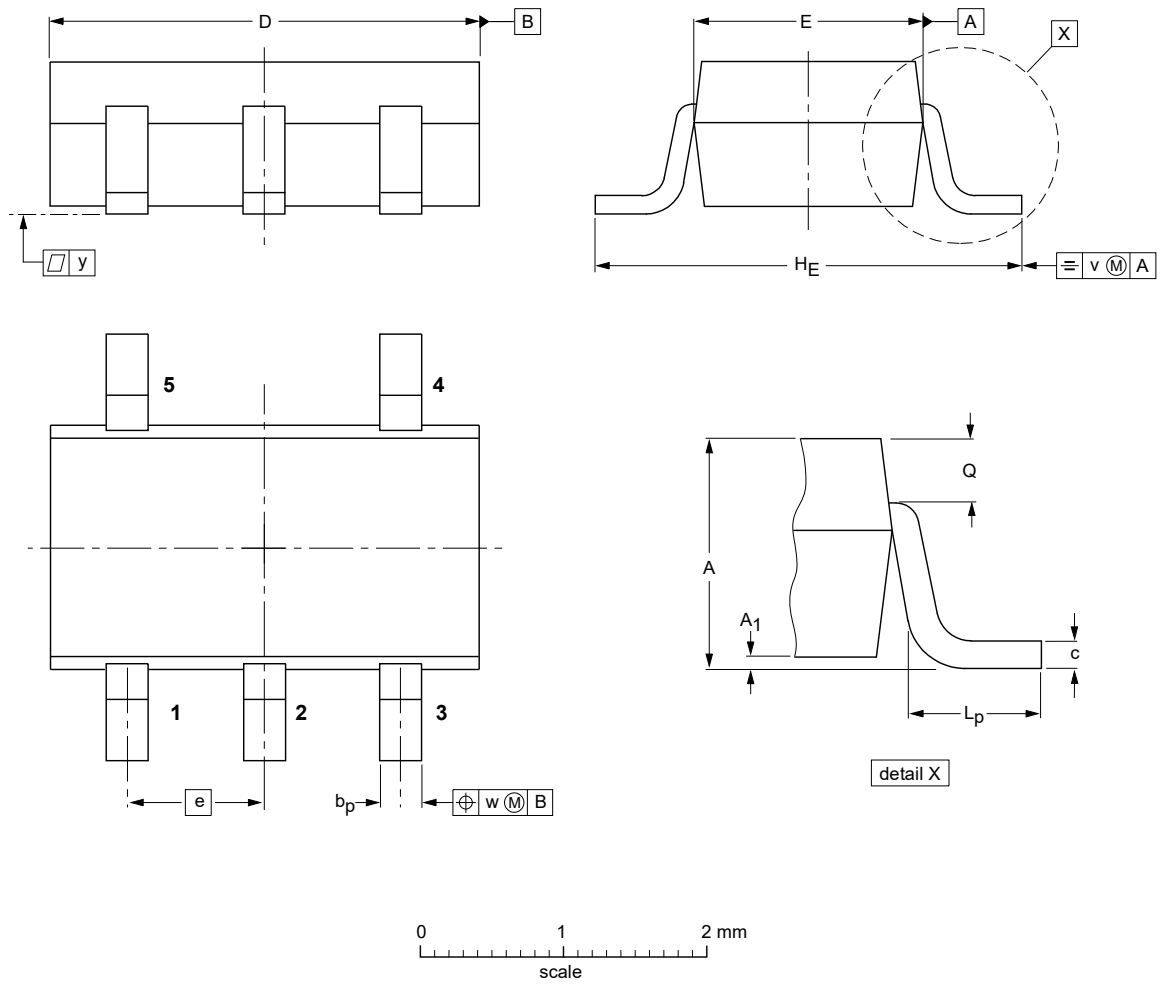
Note
1. Plastic or metal protrusions of 0.2 mm maximum per side are not included.

*sot353-1_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT353-1 | | MO-203 | SC-88A | | | ~~21-12-15~~ 21-12-16 |

**Fig. 6. Package outline SOT353-1 (TSSOP5)**

**Plastic surface-mounted package; 5 leads** **SOT753**



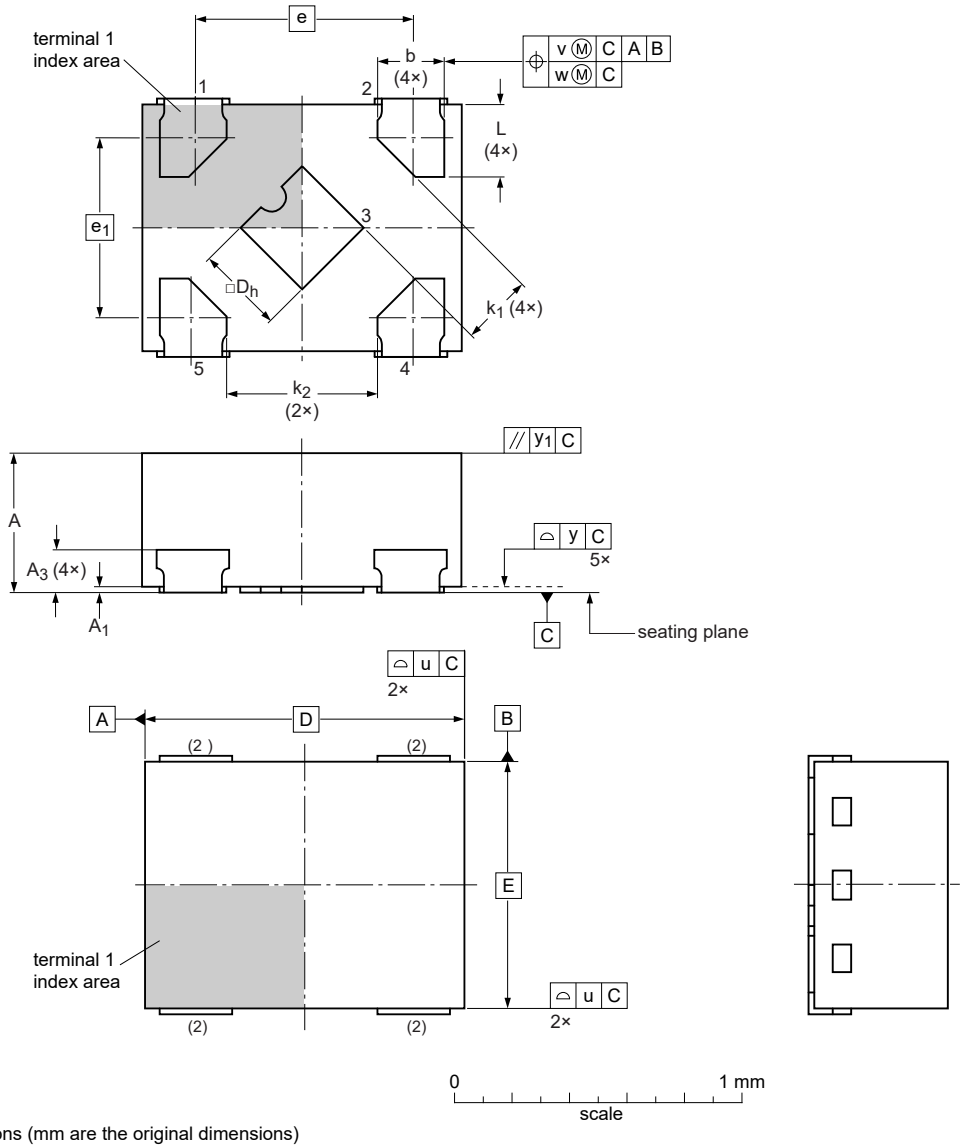

**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_1$ | $b_p$ | c | D | E | e | $H_E$ | $L_p$ | Q | v | w | y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1<br>0.9 | 0.100<br>0.013 | 0.40<br>0.25 | 0.26<br>0.10 | 3.1<br>2.7 | 1.7<br>1.3 | 0.95 | 3.0<br>2.5 | 0.6<br>0.2 | 0.33<br>0.23 | 0.2 | 0.2 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT753 | | | SC-74A | | | ~~02-04-16~~<br>06-03-16 |

**Fig. 7. Package outline SOT753 (SC-74A)**

**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**




Dimensions (mm are the original dimensions)

| Unit | | A(1) | A1 | A3 | b | D(1) | Dh | E(1) | e | e1 | k1 | k2 | L | u | v | w | y | y1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 0.50 | 0.040 | 0.135 (typ) | 0.28 | 1.10 | 0.35 | 0.85 | 0.75 | 0.6 | | | 0.30 | 0.05 | 0.1 | 0.05 | 0.05 | 0.05 |
| | nom | 0.47 | 0.020 | | 0.23 | | 0.30 | | | | 0.2 | 0.45 | 0.25 | | | | | |
| | min | 0.44 | 0.005 | | 0.20 | | 0.27 | | | | | | 0.22 | | | | | |

Note:
1. Plastic or metal protrusions per side are not included.
2. Side wettable flanks (SWF), protrusion max. 0.02 mm.

*sot8065-1_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT8065-1 | | MO-340 | | | | ~~24-07-09~~ 24-08-27 |

**Fig. 8. Package outline SOT8065-1 (XSON5)**

# 13. Abbreviations

**Table 9. 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 |

# 14. Revision history

**Table 10. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| 74HC_HCT1G00_Q100 v.4 | 20250314 | Product data sheet | - | 74HC_HCT1G00_Q100 v.3 |
| Modifications | • Type numbers 74HC1G00GZ-Q100 and 74HCT1G00GZ-Q100 (SOT8065-1/XSON5) added. | | | |
| 74HC_HCT1G00_Q100 v.3 | 20240620 | Product data sheet | - | 74HC_HCT1G00_Q100 v.2 |
| Modifications | • Section 2: ESD specification updated according to the latest JEDEC standard.<br>• Table 5: $P_{tot}$ total power dissipation corrected. | | | |
| 74HC_HCT1G00_Q100 v.2 | 20220121 | Product data sheet | - | 74HC_HCT1G00_Q100 v.1 |
| Modifications | • The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.<br>• Legal texts have been adapted to the new company name where appropriate.<br>• Section 2 updated.<br>• Table 5: Derating values for $P_{tot}$ total power dissipation updated.<br>• Fig. 6: Package outline drawing for SOT353-1 (TSSOP5) has been changed. | | | |
| 74HC_HCT1G00_Q100 v.1 | 20130916 | Product data sheet | - | - |

# 15. Legal information

## Data sheet status

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

[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term 'short data sheet' is explained in section "Definitions".
[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 https://www.nexperia.com.

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