# 74HC1G126; 74HCT1G126

## Bus buffer/line driver; 3-state

Rev. 04 — 20 July 2007 Product data sheet

## 1. General description

The 74HC1G126 and 74HCT1G126 are high-speed, Si-gate CMOS devices. They provide one non-inverting buffer/line driver with 3-state output. The 3-state output is controlled by the output enable input pin (OE). A LOW at pin OE causes the output as assume a high-impedance OFF-state.

The HC device has CMOS input switching levels and supply voltage range 2 V to 6 V.

The HCT device has TTL input switching levels and supply voltage range 4.5 V to 5.5 V.

The bus driver output currents are equal to those of the 74HC126 and 74HCT126.

## 2. Features

- Symmetrical output impedance
- High noise immunity
- Low power dissipation
- Balanced propagation delays
- SOT353-1 and SOT753 package options

## 3. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74HC1G126GW | –40 °C to +125 °C | TSSOP5 | plastic thin shrink small outline package; 5 leads; body width 1.25 mm | SOT353-1 |
| 74HCT1G126GW | | | | |
| 74HC1G126GV | –40 °C to +125 °C | SC-74A | plastic surface-mounted package; 5 leads | SOT753 |
| 74HCT1G126GV | | | | |

## 4. Marking

**Table 2. Marking codes**

| Type number | Marking |
|---|---|
| 74HC1G126GW | HN |
| 74HCT1G126GW | TN |
| 74HC1G126GV | H26 |
| 74HCT1G126GV | T26 |

## 5. Functional diagram

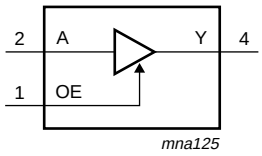



Fig 1. Logic symbol

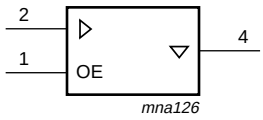



Fig 2. IEC logic symbol

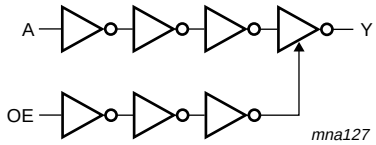



Fig 3. Logic diagram

## 6. Pinning information

### 6.1 Pinning

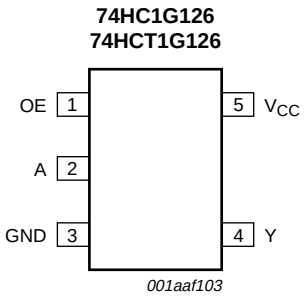



Fig 4. Pin configuration

### 6.2 Pin description

Table 3. Pin description

| Symbol | Pin | Description |
|---|---|---|
| OE | 1 | output enable 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; X = don't care; Z = high-impedance OFF-state*

| Inputs | | Output |
|---|---|---|
| **OE** | **A** | **Y** |
| H | L | L |
| H | H | H |
| L | X | Z |

## 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).* [1]

| 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 | | - | ±20 | mA |
| $I_{OK}$ | output clamping current | $V_O < –0.5$ V or $V_O > V_{CC} + 0.5$ V | | - | ±20 | mA |
| $I_O$ | output current | $–0.5$ V $< V_O < V_{CC} + 0.5$ V | | - | ±35.0 | mA |
| $I_{CC}$ | supply current | | | - | 70 | mA |
| $I_{GND}$ | ground current | | | –70 | - | mA |
| $T_{stg}$ | storage temperature | | | –65 | +150 | °C |
| $P_{tot}$ | total power dissipation | $T_{amb}$ = –40 °C to +125 °C | [2] | - | 200 | mW |

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

[2] Above 55 °C the value of $P_{tot}$ derates linearly with 2.5 mW/K.

## 9. Recommended operating conditions

**Table 6. Recommended operating conditions**

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

| Symbol | Parameter | Conditions | 74HC1G126 | | | 74HCT1G126 | | | 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 |
| $\Delta t/\Delta V$ | 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 | |
| **For type 74HC1G126** | | | | | | | | |
| $V_{IH}$ | 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 |

**Table 7. Static characteristics** *...continued*

*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 | |
| $V_{OH}$ | 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 |
| | | $I_O$ = –6.0 mA; $V_{CC}$ = 4.5 V | 3.84 | 4.32 | - | 3.7 | - | V |
| | | $I_O$ = –7.8 mA; $V_{CC}$ = 6.0 V | 5.34 | 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 |
| | | $I_O$ = 6.0 mA; $V_{CC}$ = 4.5 V | - | 0.15 | 0.33 | - | 0.4 | V |
| | | $I_O$ = 7.8 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 |
| $I_{OZ}$ | OFF-state output current | $V_I$ = $V_{IH}$ or $V_{IL}$; $V_O$ = $V_{CC}$ or GND; $V_{CC}$ = 6.0 V | - | - | 5 | - | 10 | 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 |
| **For type 74HCT1G126** | | | | | | | | |
| $V_{IH}$ | 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 $V_{IL}$; $V_{CC}$ = 4.5 V | | | | | | |
| | | $I_O$ = –20 µA | 4.4 | 4.5 | - | 4.4 | - | V |
| | | $I_O$ = –6.0 mA | 3.84 | 4.32 | - | 3.7 | - | V |
| $V_{OL}$ | LOW-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$; $V_{CC}$ = 4.5 V | | | | | | |
| | | $I_O$ = 20 µA | - | 0 | 0.1 | - | 0.1 | V |
| | | $I_O$ = 6.0 mA | - | 0.16 | 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 |
| $I_{OZ}$ | OFF-state output current | $V_I$ = $V_{IH}$ or $V_{IL}$; $V_O$ = $V_{CC}$ or GND; $V_{CC}$ = 5.5 V | - | - | 5 | - | 10 | |
| $I_{CC}$ | 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**

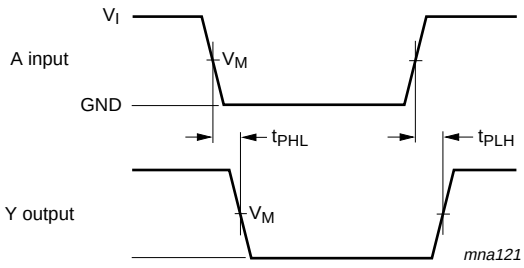
*GND = 0 V; $t_r = t_f \leq 6.0$ ns; $C_L$ = 50 pF unless otherwise specified. All typical values are measured at $T_{amb}$ = 25 °C. For test circuit see Figure 7*

| Symbol | Parameter | Conditions | | −40 °C to +85 °C | | | −40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Min | Typ | Max | Min | Max | |
| **For type 74HC1G126** | | | | | | | | | |
| $t_{pd}$ | propagation delay | A to Y; see Figure 5 | [1] | | | | | | |
| | | $V_{CC}$ = 2.0 V | | - | 24 | 125 | - | 150 | ns |
| | | $V_{CC}$ = 4.5 V | | - | 10 | 25 | - | 30 | ns |
| | | $V_{CC}$ = 5.0 V; $C_L$ = 15 pF | | - | 9 | - | - | - | ns |
| | | $V_{CC}$ = 6.0 V | | - | 9 | 21 | - | 26 | ns |
| $t_{en}$ | enable time | OE to Y; see Figure 6 | [1] | | | | | | |
| | | $V_{CC}$ = 2.0 V | | - | 24 | 155 | - | 190 | ns |
| | | $V_{CC}$ = 4.5 V | | - | 10 | 31 | - | 38 | ns |
| | | $V_{CC}$ = 6.0 V | | - | 8 | 26 | - | 32 | ns |
| $t_{dis}$ | disable time | OE to Y; see Figure 6 | [1] | | | | | | |
| | | $V_{CC}$ = 2.0 V | | - | 16 | 155 | - | 190 | ns |
| | | $V_{CC}$ = 4.5 V | | - | 12 | 31 | - | 38 | ns |
| | | $V_{CC}$ = 6.0 V | | - | 11 | 26 | - | 32 | ns |
| $C_{PD}$ | power dissipation capacitance | $V_I$ = GND to $V_{CC}$ | [2] | - | 30 | - | - | - | pF |
| **For type 74HCT1G126** | | | | | | | | | |
| $t_{pd}$ | propagation delay | A to Y; see Figure 5 | [1] | | | | | | |
| | | $V_{CC}$ = 4.5 V | | - | 11 | 30 | - | 36 | ns |
| | | $V_{CC}$ = 5.0 V; $C_L$ = 15 pF | | - | 10 | - | - | - | ns |
| $t_{en}$ | enable time | OE to Y; see Figure 6; $V_{CC}$ = 4.5 V | [1] | - | 10 | 35 | - | 42 | ns |
| $t_{dis}$ | disable time | OE to Y; see Figure 6; $V_{CC}$ = 4.5 V | [1] | - | 12 | 31 | - | 38 | ns |
| $C_{PD}$ | power dissipation capacitance | $V_I$ = GND to $V_{CC}$ − 1.5 V | [2] | - | 27 | - | - | - | pF |

[1] $t_{pd}$ 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 $t_{PHZ}$.

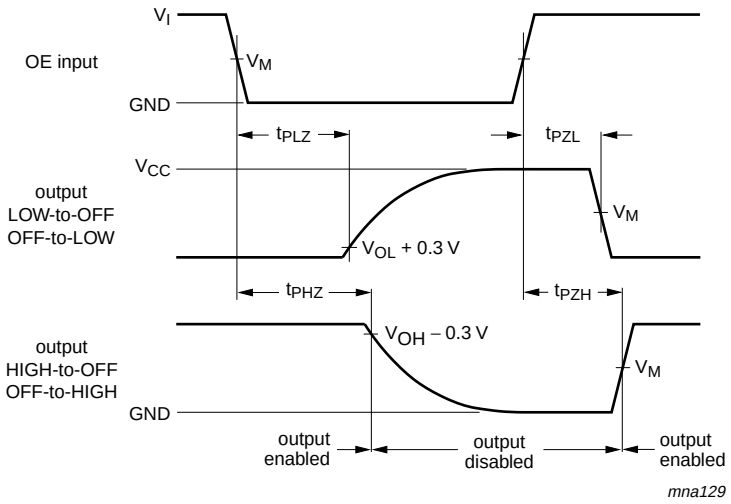
[2] $C_{PD}$ is used to determine the dynamic power dissipation $P_D$ (µW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o)$ where:
$f_i$ = input frequency in MHz
$f_o$ = output frequency in MHz
$C_L$ = output load capacitance in pF
$V_{CC}$ = supply voltage in Volts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

## 12. Waveforms




Measurement points are given in Table 9.

**Fig 5. The input (A) to output (Y) propagation delays**

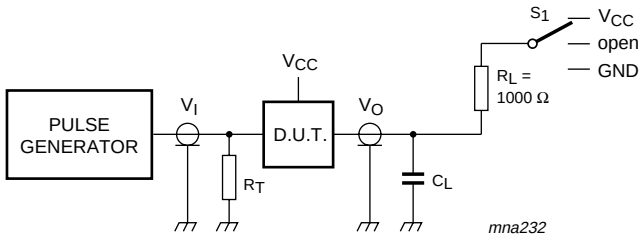



Measurement points are given in Table 9.

**Fig 6. The 3-state enable and disable times**

**Table 9. Measurement points**

| Type | Input | | Output |
|---|---|---|---|
| | $V_M$ | $V_I$ | $V_M$ |
| 74HC1G126 | $0.5 \times V_{CC}$ | GND to $V_{CC}$ | $0.5 \times V_{CC}$ |
| 74HCT1G126 | 1.3 V | GND to 3.0 V | 1.3 V |




Test data is given in Table 8. Definitions for test circuit:

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

$C_L$ = Load capacitance including jig and probe capacitance

$R_L$ = Load resistance

For $t_{PLH}$, $t_{PHL}$, $S_1$ = open

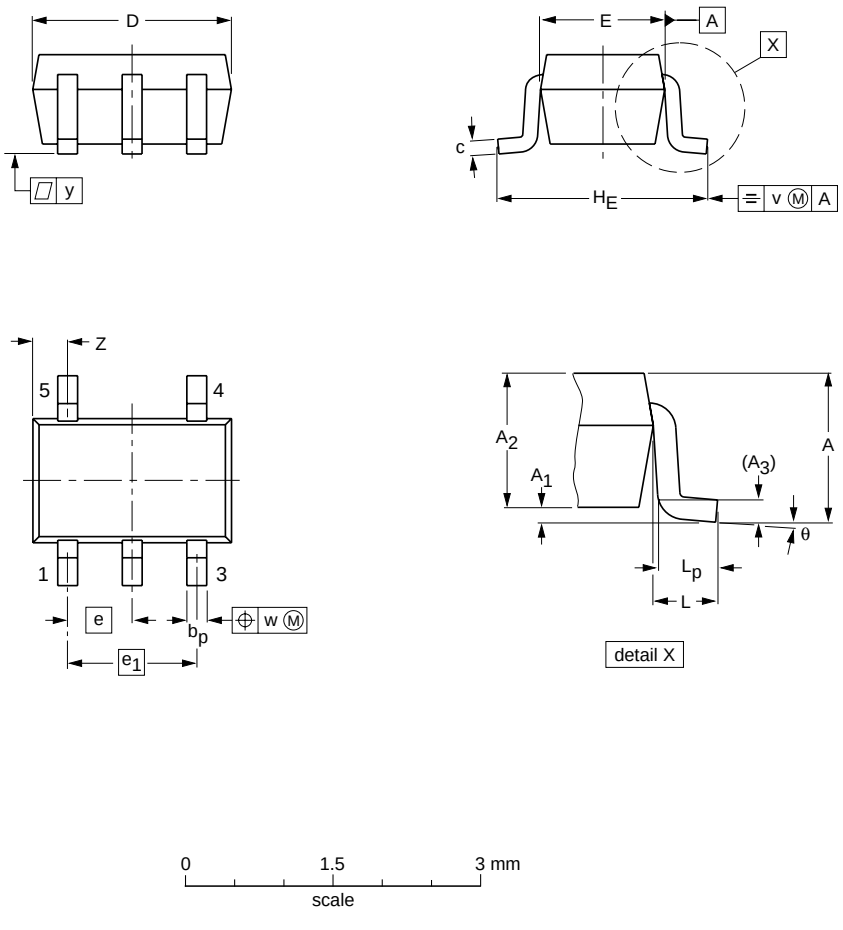
For $t_{PLZ}$, $t_{PZL}$, $S_1$ = $V_{CC}$

For $t_{PHZ}$, $t_{PZH}$, $S_1$ = GND

**Fig 7. Load circuitry for switching times**

## 13. 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 max. | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | $D^{(1)}$ | $E^{(1)}$ | e | $e_1$ | $H_E$ | L | $L_p$ | v | w | y | $Z^{(1)}$ | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1 | 0.1<br>0 | 1.0<br>0.8 | 0.15 | 0.30<br>0.15 | 0.25<br>0.08 | 2.25<br>1.85 | 1.35<br>1.15 | 0.65 | 1.3 | 2.25<br>2.0 | 0.425 | 0.46<br>0.21 | 0.3 | 0.1 | 0.1 | 0.60<br>0.15 | 7°<br>0° |

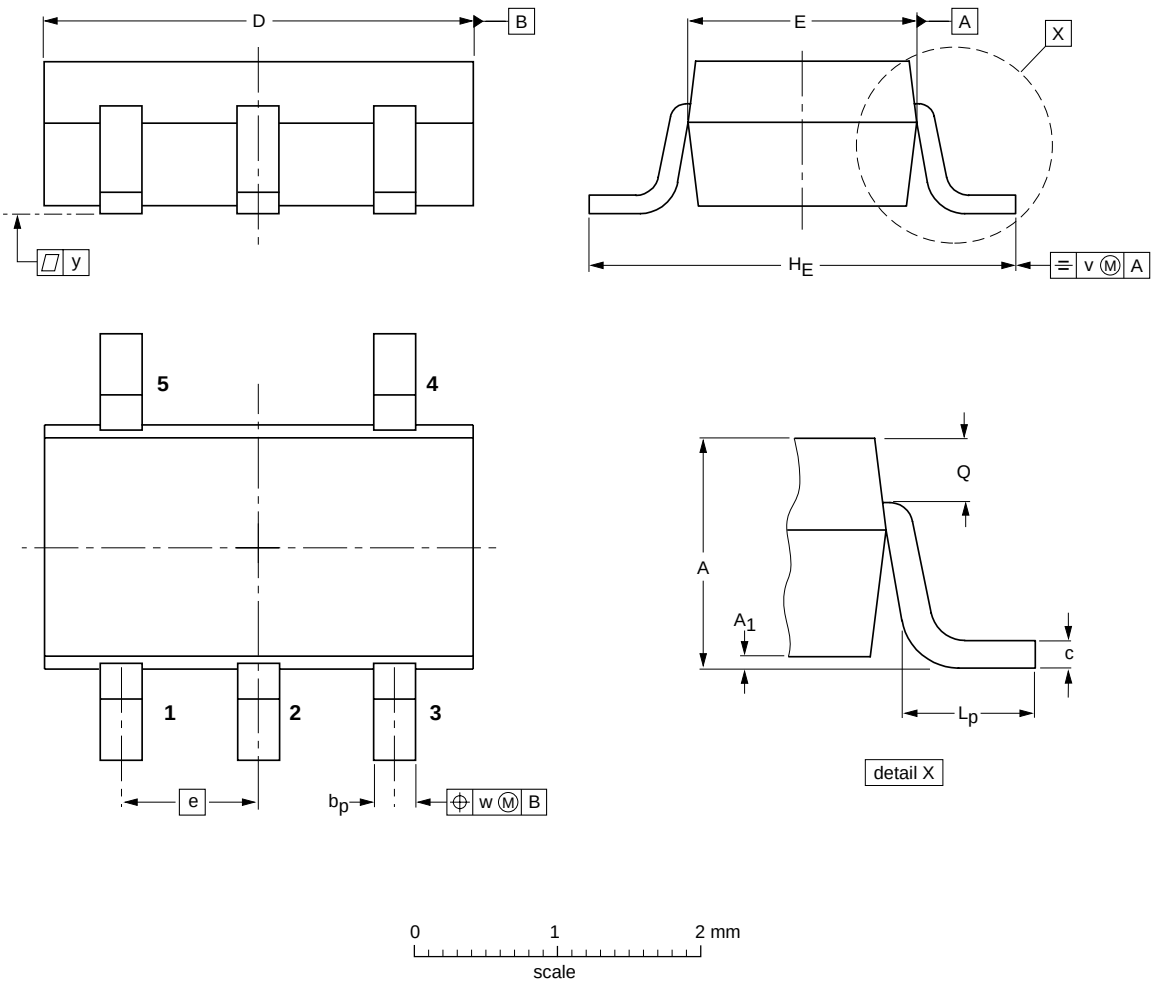
**Note**

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT353-1 | | MO-203 | SC-88A | | | ~~00-09-01~~<br>03-02-19 |

**Fig 8. 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 9. Package outline SOT753 (SC-74A)**

## 14. Abbreviations

**Table 10. Abbreviations**

| Acronym | Description |
|---|---|
| DUT | Device Under Test |
| TTL | Transistor-Transistor Logic |

## 15. Revision history

**Table 11. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| 74HC_HCT1G126_4 | 20070720 | Product data sheet | - | 74HC_HCT1G126_3 |
| Modifications: | • The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.<br>• Legal texts have been adapted to the new company name where appropriate.<br>• Package SOT353 changed to SOT353-1 in Table 1 and Figure 8.<br>• Quick Reference Data and Soldering sections removed.<br>• Section 2 “Features” updated. | | | |
| 74HC_HCT1G126_3 | 20020515 | Product specification | - | 74HC_HCT1G126_2 |
| 74HC_HCT1G126_2 | 20010406 | Product specification | - | 74HC_HCT1G126 |
| 74HC_HCT1G126 | 19970924 | Preliminary specification | - | - |

# 16. Legal information

## 16.1 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 URL http://www.nxp.com.

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For sales office addresses, please send an email to: salesaddresses@nxp.com

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