

# 74AHC1G126; 74AHCT1G126

Bus buffer/line driver; 3-state

Rev. 06 — 25 May 2007

Product data sheet

## 1. General description

74AHC1G126 and 74AHCT1G126 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 to assume a high-impedance OFF-state.

The AHC device has CMOS input switching levels and supply voltage range 2 V to 5.5 V.

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

## 2. Features

- Symmetrical output impedance
- High noise immunity
- Low power dissipation
- Balanced propagation delays
- SOT353-1 and SOT753 package options
- ESD protection:
  - ◆ HBM JESD22-A114E: exceeds 2000 V
  - ◆ MM JESD22-A115-A: exceeds 200 V
  - ◆ CDM JESD22-C101C: exceeds 1000 V
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$

## 3. Ordering information

Table 1. Ordering information

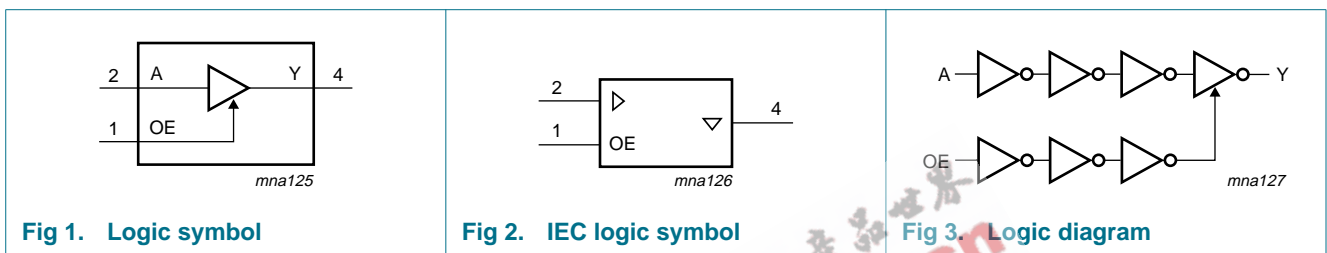
Type number	Package			
	Temperature range	Name	Description	Version
74AHC1G126GW	$-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74AHCT1G126GW				
74AHC1G126GV	$-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$	SC-74A	plastic surface-mounted package; 5 leads	SOT753
74AHCT1G126GV				

## 4. Marking

**Table 2. Marking codes**

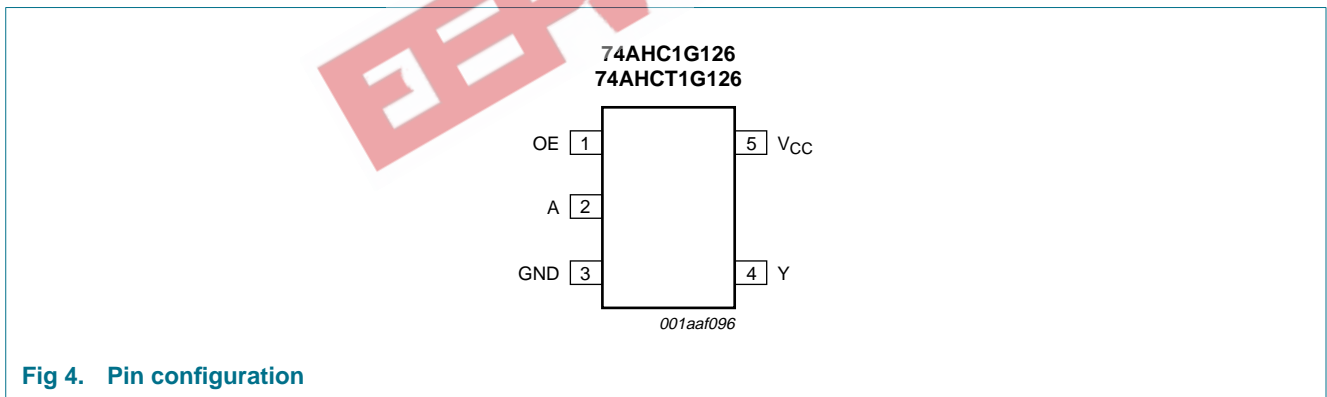
Type number	Marking
74AHC1G126GW	AN
74AHC1G126GV	A26
74AHCT1G126GW	CN
74AHCT1G126GV	C26

## 5. Functional diagram



## 6. Pinning information

### 6.1 Pinning



### 6.2 Pin description

**Table 3. Pin description**

Symbol	Pin	Description
OE	1	output enable input
A	2	data input A
GND	3	ground (0 V)
Y	4	data output Y
V <sub>CC</sub>	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

Input		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).

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>CC</sub>	supply voltage		-0.5	+7.0	V
V <sub>I</sub>	input voltage		-0.5	+7.0	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < -0.5 V	-20	-	mA
I <sub>OK</sub>	output clamping current	V <sub>O</sub> < -0.5 V or V <sub>O</sub> > V <sub>CC</sub> + 0.5 V	-	±20	mA
I <sub>O</sub>	output current	-0.5 V < V <sub>O</sub> < V <sub>CC</sub> + 0.5 V	-	±25	mA
I <sub>CC</sub>	supply current		-	75	mA
I <sub>GND</sub>	ground current		-75	-	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = -40 °C to +125 °C	-	250	mW

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

[2] For both TSSOP5 and SC-74A packages: above 87.5 °C the value of P<sub>tot</sub> derates linearly with 4.0 mW/K.

## 9. Recommended operating conditions

**Table 6. Recommended operating conditions**

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

Symbol	Parameter	Conditions	74AHC1G126			74AHCT1G126			Unit
			Min	Typ	Max	Min	Typ	Max	
V <sub>CC</sub>	supply voltage		2.0	5.0	5.5	4.5	5.0	5.5	V
V <sub>I</sub>	input voltage		0	-	5.5	0	-	5.5	V
V <sub>O</sub>	output voltage		0	-	V <sub>CC</sub>	0	-	V <sub>CC</sub>	V
T <sub>amb</sub>	ambient temperature		-40	+25	+125	-40	+25	+125	°C
Δt/ΔV	input transition rise and fall rate	V <sub>CC</sub> = 3.3 V ± 0.3 V	-	-	100	-	-	-	ns/V
		V <sub>CC</sub> = 5.0 V ± 0.5 V	-	-	20	-	-	20	ns/V

10. 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	
<b>For type 74AHC1G126</b>										
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	-	-	1.5	-	1.5	-	V
		V <sub>CC</sub> = 3.0 V	2.1	-	-	2.1	-	2.1	-	V
		V <sub>CC</sub> = 5.5 V	3.85	-	-	3.85	-	3.85	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	-	0.5	-	0.5	-	0.5	V
		V <sub>CC</sub> = 3.0 V	-	-	0.9	-	0.9	-	0.9	V
		V <sub>CC</sub> = 5.5 V	-	-	1.65	-	1.65	-	1.65	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>								
		I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 3.0 V	2.9	3.0	-	2.9	-	2.9	-	V
		I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.58	-	-	2.48	-	2.40	-	V
I <sub>O</sub> = -8.0 mA; V <sub>CC</sub> = 4.5 V	3.94	-	-	3.8	-	3.70	-	V		
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>								
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 3.0 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.36	-	0.44	-	0.55	V
I <sub>O</sub> = 8.0 mA; V <sub>CC</sub> = 4.5 V	-	-	0.36	-	0.44	-	0.55	V		
I <sub>OZ</sub>	OFF-state output current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V	-	-	±0.25	-	±2.5	-	±10	μA
I <sub>I</sub>	input leakage current	V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 0 V to 5.5 V	-	-	0.1	-	1.0	-	2.0	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V	-	-	2.0	-	20	-	40	μA
C <sub>I</sub>	input capacitance		-	3	10	-	10	-	10	pF
<b>For type 74AHCT1G126</b>										
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	2.0	-	-	2.0	-	2.0	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	0.8	-	0.8	-	0.8	V
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> = -50 μA	4.4	4.5	-	4.4	-	4.4	-	V
		I <sub>O</sub> = -8.0 mA	3.94	-	-	3.8	-	3.70	-	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> = 50 μA	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 8.0 mA	-	-	0.36	-	0.44	-	0.55	V

**Table 7. Static characteristics ...continued**  
 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	
$I_{OZ}$	OFF-state output current	$V_I = V_{IH}$ or $V_{IL}$ ; $V_O = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	±0.25	-	±2.5	-	±10	µA
$I_I$	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	-	-	2.0	-	20	-	40	µA
$\Delta I_{CC}$	additional supply current	per input pin; $V_I = V_{CC} - 2.1$ V; other inputs at $V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 4.5$ V to 5.5 V	-	-	1.35	-	1.5	-	1.5	mA
$C_i$	input capacitance		-	3	10	-	10	-	10	pF

## 11. Dynamic characteristics

**Table 8. Dynamic characteristics**  
 $GND = 0$  V;  $t_r = t_f = \leq 3.0$  ns. For test circuit see [Figure 7](#).

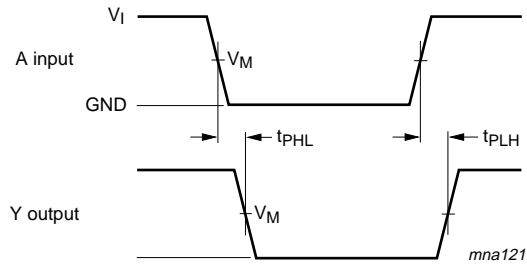
Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
<b>For type 74AHC1G126</b>										
$t_{pd}$	propagation delay	A to Y; see <a href="#">Figure 5</a> <a href="#">[1]</a>								
		$V_{CC} = 3.0$ V to 3.6 V <a href="#">[2]</a>								
		$C_L = 15$ pF	-	4.4	8.0	1.0	9.5	1.0	10.0	ns
		$C_L = 50$ pF	-	6.3	11.5	1.0	13.0	1.0	14.5	ns
		$V_{CC} = 4.5$ V to 5.5 V <a href="#">[3]</a>								
		$C_L = 15$ pF	-	3.4	5.5	1.0	6.5	1.0	7.0	ns
$t_{en}$	enable time	OE to Y; see <a href="#">Figure 6</a> <a href="#">[1]</a>								
		$V_{CC} = 3.0$ V to 3.6 V <a href="#">[2]</a>								
		$C_L = 15$ pF	-	4.9	8.0	1.0	9.5	1.0	10.0	ns
		$C_L = 50$ pF	-	7.0	11.5	1.0	13.0	1.0	14.5	ns
		$V_{CC} = 4.5$ V to 5.5 V <a href="#">[3]</a>								
		$C_L = 15$ pF	-	3.6	5.6	1.0	6.3	1.0	7.0	ns
$t_{dis}$	disable time	OE to Y; see <a href="#">Figure 6</a> <a href="#">[1]</a>								
		$V_{CC} = 3.0$ V to 3.6 V <a href="#">[2]</a>								
		$C_L = 15$ pF	-	6.3	9.7	1.0	11.5	1.0	12.5	ns
		$C_L = 50$ pF	-	9.0	13.2	1.0	15.0	1.0	16.5	ns
		$V_{CC} = 4.5$ V to 5.5 V <a href="#">[3]</a>								
		$C_L = 15$ pF	-	4.3	6.8	1.0	8.0	1.0	8.5	ns
		$C_L = 50$ pF	-	6.1	8.8	1.0	10.0	1.0	11.0	ns

**Table 8. Dynamic characteristics ...continued**  
*GND = 0 V;  $t_r = t_f \leq 3.0$  ns. For test circuit see Figure 7.*

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit	
			Min	Typ	Max	Min	Max	Min	Max		
$C_{PD}$	power dissipation capacitance	per buffer; $C_L = 50$ pF; $f = 1$ MHz; $V_I = GND$ to $V_{CC}$	[4]	-	9	-	-	-	-	pF	
<b>For type 74AHCT1G126</b>											
$t_{pd}$	propagation delay	A to Y; see Figure 5	[1]								
		$V_{CC} = 4.5$ V to 5.5 V	[3]								
		$C_L = 15$ pF		-	3.4	5.5	1.0	6.5	1.0	7.0	ns
		$C_L = 50$ pF		-	4.7	7.5	1.0	8.5	1.0	9.5	ns
$t_{en}$	enable time	$\overline{OE}$ to Y; see Figure 6	[1]								
		$V_{CC} = 4.5$ V to 5.5 V	[3]								
		$C_L = 15$ pF		-	3.4	5.6	1.0	6.3	1.0	6.5	ns
		$C_L = 50$ pF		-	4.8	8.0	1.0	9.0	1.0	9.0	ns
$t_{dis}$	disable time	$\overline{OE}$ to Y; see Figure 6	[1]								
		$V_{CC} = 4.5$ V to 5.5 V	[3]								
		$C_L = 15$ pF			4.0	6.8	1.0	8.0	1.0	8.5	ns
		$C_L = 50$ pF			5.7	8.8	1.0	10.0	1.0	11.5	ns
$C_{PD}$	power dissipation capacitance	per buffer; $C_L = 50$ pF; $f = 1$ MHz; $V_I = GND$ to $V_{CC}$	[4]	-	11	-	-	-	-	pF	

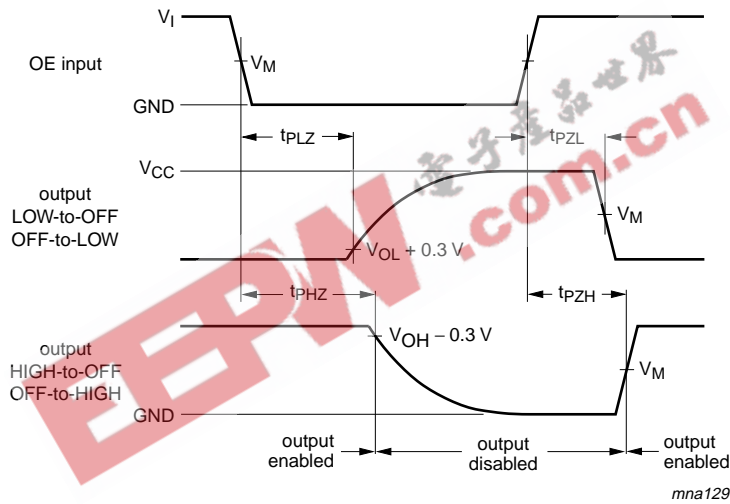
- [1]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .  
 $t_{en}$  is the same as  $t_{PZL}$  and  $t_{PZH}$ .  
 $t_{dis}$  is the same as  $t_{PLZ}$  and  $t_{PHZ}$ .
- [2] Typical values are measured at  $V_{CC} = 3.3$  V.
- [3] Typical values are measured at  $V_{CC} = 5.0$  V.
- [4]  $C_{PD}$  is used to determine the dynamic power dissipation  $P_D$  ( $\mu$ W).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o)$  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.

## 12. Waveforms



Measurement points are given in [Table 9](#).

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

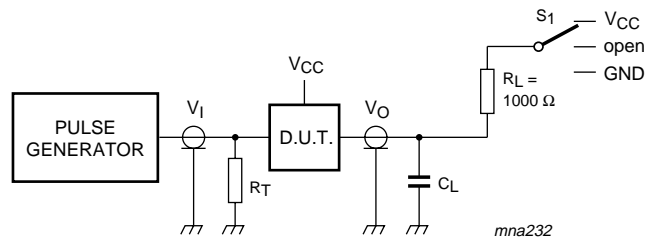


Measurement points are given in [Table 9](#).

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

**Table 9. Measurement points**

Type	Input		Output
	$V_M$	$V_I$	$V_M$
74AHC1G126	$0.5 \times V_{CC}$	GND to $V_{CC}$	$0.5 \times V_{CC}$
74AHCT1G126	1.5 V	GND to 3.0 V	$0.5 \times V_{CC}$



For test data see [Table 8](#). Definitions for test circuit:

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

$R_L$  = Load resistance.

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

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

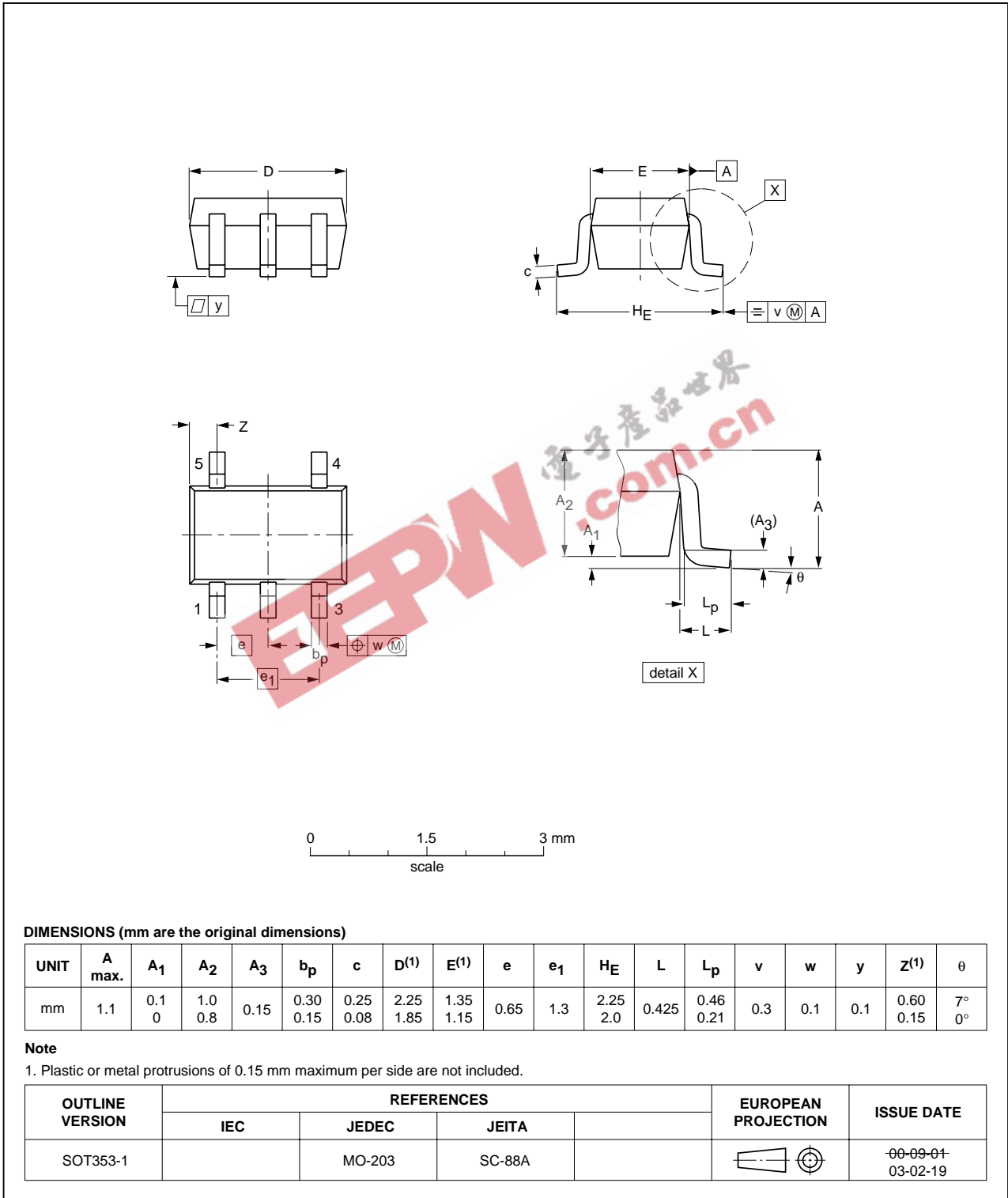


Fig 8. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753

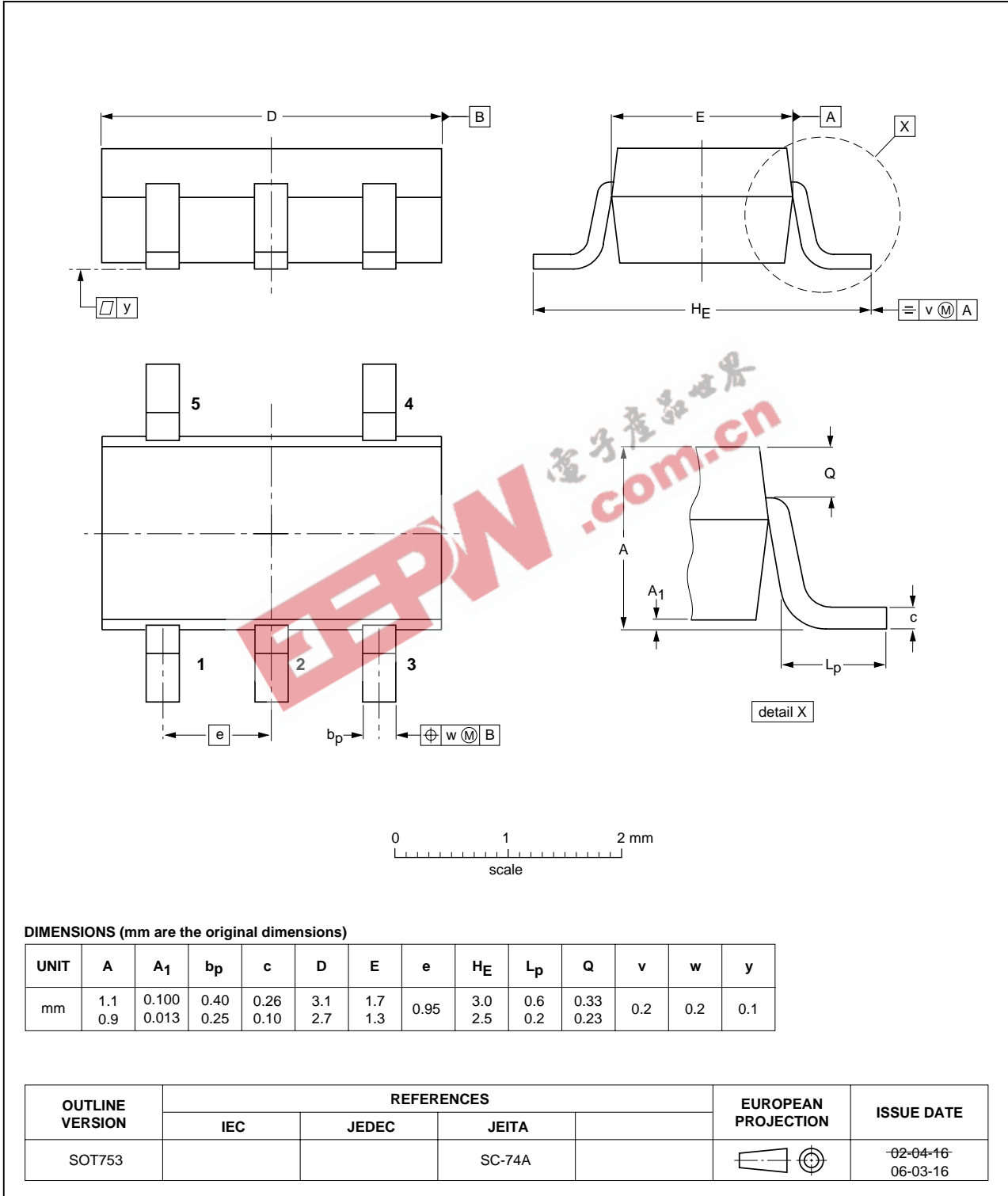


Fig 9. Package outline SOT753 (SC-74A)

## 14. Abbreviations

**Table 10. Abbreviations**

Acronym	Description
CDM	Charged Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
TTL	Transistor-Transistor Logic

## 15. Revision history

**Table 11. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AHC_AHCT1G126_6	20070525	Product data sheet	-	74AHC_AHCT1G126_5
Modifications:	<ul style="list-style-type: none"> <li>• Typos in ordering numbers corrected in <a href="#">Table 1 "Ordering information"</a>.</li> </ul>			
74AHC_AHCT1G126_5	20070514	Product data sheet	-	74AHC_AHCT1G126_4
Modifications:	<ul style="list-style-type: none"> <li>• Package SOT353 changed to SOT353-1 in <a href="#">Section 3</a> and <a href="#">Section 13</a>.</li> <li>• Quick reference data and Soldering sections removed.</li> <li>• <a href="#">Section 2 "Features"</a> updated.</li> <li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>• Legal texts have been adapted to the new company name where appropriate.</li> </ul>			
74AHC_AHCT1G126_4	20020606	Product specification	-	74AHC_AHCT1G126_3
74AHC_AHCT1G126_3	20020215	Product specification	-	74AHC_AHCT1G126_2
74AHC_AHCT1G126_2	20010406	Product specification	-	74AHC1G_AHCT1G126_1
74AHC1G_AHCT1G126_1	19990920	Product specification	-	-

## 16. Legal information

### 16.1 Data sheet status

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

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

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

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

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For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

Date of release: 25 May 2007

Document identifier: 74AHC\_AHCT1G126\_6