74AHC126; 74AHCT126

Quad buffer/line driver; 3-state

Rev. 03 — 25 April 2008

Product data sheet

1. General description

The 74AHC126; 74AHCT126 is a high-speed Si-gate CMOS device and is pin compatible with Low-power Schottky TTL (LSTTL). It is specified in compliance with JEDEC standard No. 7-A.

The 74AHC126; 74AHCT126 provides four non-inverting buffer/line drivers with 3-state outputs. The 3-state outputs (nY) are controlled by the output enable input (nOE). A LOW-level at pin nOE causes the outputs to assume a high-impedance OFF-state.

The 74AHC126; 74AHCT126 is identical to the 74AHC125; 74AHCT125 but has active HIGH output enable inputs.

2. Features

- Balanced propagation delays
- All inputs have Schmitt-trigger actions
- Inputs accept voltages higher than V_{CC}
- Input levels:
 - ◆ For 74AHC126: CMOS level
 - ◆ For 74AHCT126: TTL level
- ESD protection:
 - HBM EIA/JESD22-A114E exceeds 2000 V
 - ◆ MM EIA/JESD22-A115-A exceeds 200 V
 - CDM EIA/JESD22-C101C exceeds 1000 V
- Multiple package options
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C

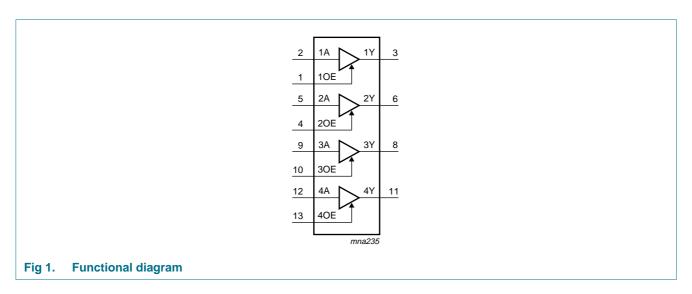


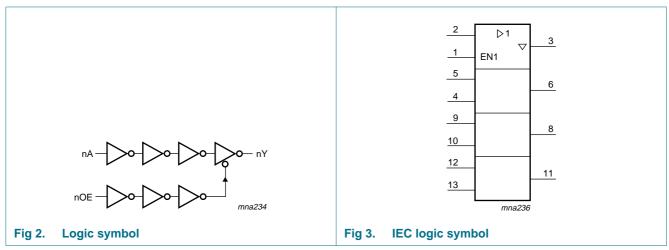
3. Ordering information

Table 1. Ordering information

Type number	Package	Package										
	Temperature range	Name	Description	Version								
74AHC126												
74AHC126D	–40 °C to +125 °C	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1								
74AHC126PW	–40 °C to +125 °C	TSSOP14	plastic thin shrink small outline package; 14 leads; body width 4.4 mm	SOT402-1								
74AHCT126												
74AHCT126D	–40 °C to +125 °C	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1								
74AHCT126PW	–40 °C to +125 °C	TSSOP14	plastic thin shrink small outline package; 14 leads; body width 4.4 mm	SOT402-1								

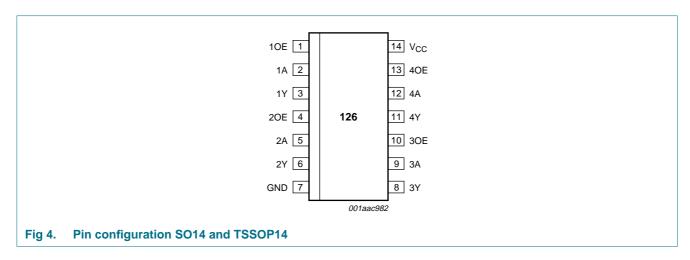
4. Functional diagram





5. Pinning information

5.1 Pinning



5.2 Pin description

Table 2. Pin description

0	D'	B
Symbol	Pin	Description
10E	1	output enable input 1 (active HIGH)
1A	2	data input 1
1Y	3	data output 1
20E	4	output enable input 2 (active HIGH)
2A	5	data input 2
2Y	6	data output 2
GND	7	ground (0 V)
3Y	8	data output 3
3A	9	data input 3
30E	10	output enable input 3 (active HIGH)
4Y	11	data output 4
4A	12	data input 4
40E	13	output enable input 4 (active HIGH)
V _{CC}	14	supply voltage

6. Functional description

Table 3. Function table [1]

Control	Input	Output
nOE	nA	nY
Н	L	L
Н	Н	Н
L	X	Z

^[1] H = HIGH voltage state;

L = LOW voltage state;

X = don't care;

Z = high-impedance OFF-state.

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

		, ,		10	,
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	$V_1 < -0.5 \text{ V}$	<u>[1]</u> –20	-	mA
I _{OK}	output clamping current	$V_O < -0.5 \text{ V or } V_O > V_{CC} + 0.5 \text{ V}$	<u>[1]</u> –20	+20	mA
Io	output current	$V_{O} = -0.5 \text{ V to } (V_{CC} + 0.5 \text{ V})$	-25	+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	$T_{amb} = -40 ^{\circ}\text{C} \text{ to } +125 ^{\circ}\text{C}$	[2] _	500	mW

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

^[2] For SO14 packages: above 70 °C the value of P_{tot} derates linearly at 8 mW/K. For TSSOP14 packages: above 60 °C the value of P_{tot} derates linearly at 5.5 mW/K.

8. Recommended operating conditions

Table 5. Operating conditions

-	Peremeter	Conditions	NA:	T	Max	I Incia
Symbol	Parameter	Conditions	Min	Тур	Max	Unit
74AHC126						
V_{CC}	supply voltage		2.0	5.0	5.5	V
VI	input voltage		0	-	5.5	V
Vo	output voltage		0	-	V_{CC}	V
T _{amb}	ambient temperature		-40	+25	+125	°C
Δt/ΔV	input transition rise and fall rate	$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	-	-	100	ns/V
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	-	20	ns/V
74AHCT126						
V _{CC}	supply voltage		4.5	5.0	5.5	V
VI	input voltage		0	-	5.5	V
Vo	output voltage		0	-	V_{CC}	V
T _{amb}	ambient temperature		-40	+25	+125	°C
Δt/ΔV	input transition rise and fall rate	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	-	20	ns/V

9. Static characteristics

Table 6. Static characteristics

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

Symbol	Parameter	Conditions		25 °C		-40 °C 1	o +85 °C	–40 °C t	o +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
74AHC1	26	'								
V_{IH}	HIGH-level	V _{CC} = 2.0 V	1.5	-	-	1.5	-	1.5	-	V
	input voltage	V _{CC} = 3.0 V	2.1	-	-	2.1	-	2.1	-	V
		V _{CC} = 5.5 V	3.85	-	-	3.85	-	3.85	-	V
V _{IL}	LOW-level	V _{CC} = 2.0 V	-	-	0.5	-	0.5	-	0.5	V
	input voltage	V _{CC} = 3.0 V	-	-	0.9	-	0.9	-	0.9	V
		V _{CC} = 5.5 V	-	-	1.65	-	1.65	-	1.65	V
V _{OH} HIGH-level		$V_I = V_{IH}$ or V_{IL}								
	output voltage	$I_O = -50 \mu A; V_{CC} = 2.0 \text{ V}$	1.9	2.0	-	1.9	-	1.9	-	V
		$I_O = -50 \mu A; V_{CC} = 3.0 \text{ V}$	2.9	3.0	-	2.9	-	2.9	-	V
		$I_O = -50 \mu A$; $V_{CC} = 4.5 \text{ V}$	4.4	4.5	-	4.4	-	4.4	-	V
		$I_{O} = -4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.58	-	-	2.48	-	2.40	-	V
		$I_{O} = -8.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.94	-	-	3.80	-	3.70	-	V
V_{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL}								
	output voltage	$I_O = 50 \mu A; V_{CC} = 2.0 V$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 50 \mu A; V_{CC} = 3.0 \text{ V}$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 50 \mu A; V_{CC} = 4.5 V$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.36	-	0.44	-	0.55	V
		I_{O} = 8.0 mA; V_{CC} = 4.5 V	-	-	0.36	-	0.44	-	0.55	V

 Table 6.
 Static characteristics ...continued

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

Symbol	Parameter	Conditions		25 °C		-40 °C	to +85 °C	–40 °C t	o +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
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	μΑ
l _{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL} ; $V_O = V_{CC}$ or GND; $V_{CC} = 5.5 \text{ V}$	-	-	±0.25	-	±2.5	-	±10.0	μΑ
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5 \text{ V}$	-	-	2.0	-	20	-	40	μΑ
Cı	input capacitance	$V_I = V_{CC}$ or GND	-	3	10	-	10	-	10	pF
Co	output capacitance		-	4	-	-	-	-	-	pF
74AHCT	126									
V_{IH}	HIGH-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	2.0	-	-	2.0	-	2.0	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	-	8.0	-	0.8	-	0.8	V
V_{OH}	HIGH-level	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5 \text{ V}$								
	output voltage	$I_{O} = -50 \mu\text{A}$	4.4	4.5	-	4.4	-	4.4	-	V
		$I_{O} = -8.0 \text{ mA}$	3.94	-	-	3.80	-	3.70	-	V
V_{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5 \text{ V}$								
	output voltage	Ι _Ο = 50 μΑ	-	0	0.1	-	0.1	-	0.1	V
		$I_0 = 8.0 \text{ mA}$	-	-	0.36	-	0.44	-	0.55	V
l _l	input leakage current	$V_I = 5.5 \text{ V or GND};$ $V_{CC} = 0 \text{ V to } 5.5 \text{ V}$	-	-	0.1	-	1.0	-	2.0	μΑ
l _{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL} ; $V_O = V_{CC}$ or GND per input pin; other inputs at V_{CC} or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	±0.25	-	±2.5	-	±10.0	μА
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5 \text{ V}$	-	-	2.0	-	20	-	40	μΑ
Δl _{CC}	additional supply current	per input pin; $V_I = V_{CC} - 2.1 \text{ V}$; other pins at V_{CC} or GND; $I_O = 0 \text{ A}$; $V_{CC} = 4.5 \text{ V}$ to 5.5 V	-	-	1.35	-	1.5	-	1.5	mA
C _I	input capacitance	$V_I = V_{CC}$ or GND	-	3	10	-	10	-	10	pF
Co	output capacitance		-	4	-	-	-	-	-	pF

10. Dynamic characteristics

Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 7.

Symbol	Parameter	Conditions			25 °C		-40 °C	to +85 °C	-40 °C 1	to +125 °C	Unit
				Min	Typ[1]	Max	Min	Max	Min	Max	1
74AHC1	26	'		ı					1		
t _{pd}	propagation	nA to nY; see Figure 5	[2]								
	delay	$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$									
		C _L = 15 pF		-	4.7	8.0	1.0	9.5	1.0	10.0	ns
		C _L = 50 pF		-	6.7	11.5	1.0	13.0	1.0	14.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$									
		C _L = 15 pF		-	3.3	5.5	1.0	6.5	1.0	7.0	ns
		$C_{L} = 50 \text{ pF}$		-	4.7	7.5	1.0	8.5	1.0	9.5	ns
t _{en}	enable time	nOE to nY; see Figure 6	[3]								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$									
		C _L = 15 pF		-	5.3	8.0	1.0	9.5	1.0	10.0	ns
		$C_{L} = 50 \text{ pF}$		-	7.6	11.5	1.0	13.0	1.0	14.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$									
		C _L = 15 pF		-	3.6	5.3	1.0	6.1	1.0	7.0	ns
		$C_{L} = 50 \text{ pF}$		-	5.1	7.6	1.0	8.7	1.0	9.5	ns
t _{dis}	disable time	nOE to nY; see Figure 6	<u>[4]</u>								
	-	$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$									
		C _L = 15 pF		-	6.6	9.7	1.0	11.5	1.0	12.5	ns
		$C_{L} = 50 \text{ pF}$		-	9.4	13.2	1.0	15.0	1.0	16.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$									
		C _L = 15 pF		-	4.7	6.8	1.0	8.0	1.0	8.5	ns
		$C_{L} = 50 \text{ pF}$		-	6.7	8.8	1.0	10.0	1.0	11.0	ns
C _{PD}	power dissipation capacitance	f_i = 1 MHz; V_I = GND to V_{CC}	<u>[5]</u>	-	10	-	-	-	-	-	pF
74AHCT	126; V _{CC} = 4.5	5 V to 5.5 V									
t _{pd}		nA to nY; see Figure 5	[2]								
	delay	C _L = 15 pF		-	3.0	5.5	1.0	6.5	1.0	7.0	ns
		$C_L = 50 pF$		-	4.3	7.5	1.0	8.5	1.0	9.5	ns
t _{en}	enable time	nOE to nY; see Figure 6	[3]								
		C _L = 15 pF		-	3.3	5.1	1.0	6.0	1.0	6.5	ns
		C _L = 50 pF		-	4.7	7.1	1.0	8.0	1.0	9.0	ns
t _{dis}	disable time	nOE to nY; see Figure 6	<u>[4]</u>								
		C _L = 15 pF		-	4.8	6.8	1.0	8.0	1.0	8.5	ns
		$C_L = 50 \text{ pF}$		-	6.9	8.9	1.0	10.0	1.0	11.5	ns
C _{PD}	power dissipation capacitance	$f_i = 1 \text{ MHz};$ $V_I = \text{GND to } V_{CC}$	<u>[5]</u>	-	12	-	-	-	-	-	pF

- [1] Typical values are measured at nominal supply voltage ($V_{CC} = 3.3 \text{ V}$ and $V_{CC} = 5.0 \text{ V}$).
- [2] t_{pd} is the same as t_{PLH} and t_{PHL} .
- [3] t_{en} is the same as t_{PZL} and t_{PZH}.
- [4] t_{dis} is the same as t_{PLZ} and t_{PHZ} .
- [5] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

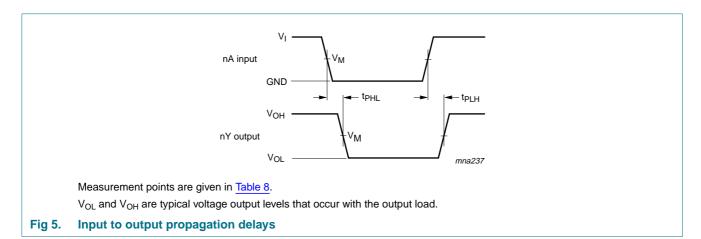
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

 $\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

11. Waveforms



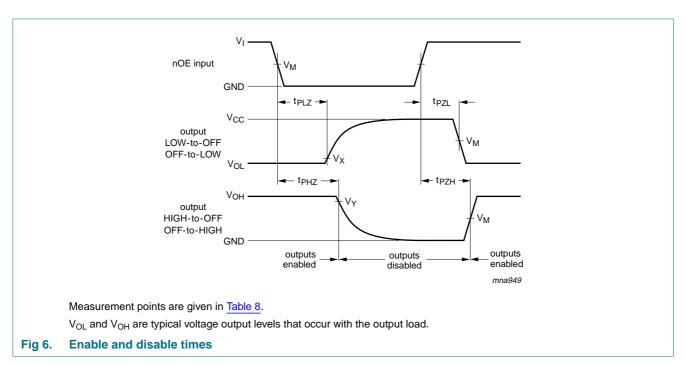
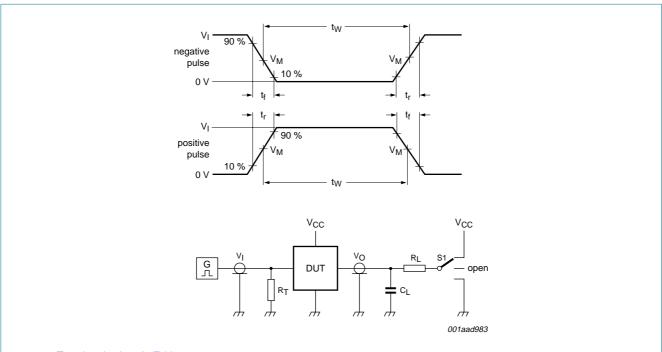


Table 8. Measurement points

Туре	Input	Output		
	V _M	V _M	V _X	V _Y
74AHC126	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	V _{OL} + 0.3 V	V _{OH} – 0.3 V
74AHCT126	1.5 V	$0.5 \times V_{CC}$	$V_{OL} + 0.3 V$	V _{OH} – 0.3 V



Test data is given in Table 9.

Definitions test circuit:

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

 C_L = load capacitance including jig and probe capacitance.

R_L = load resistance.

S1 = test selection switch.

Fig 7. Test circuitry for measuring switching times

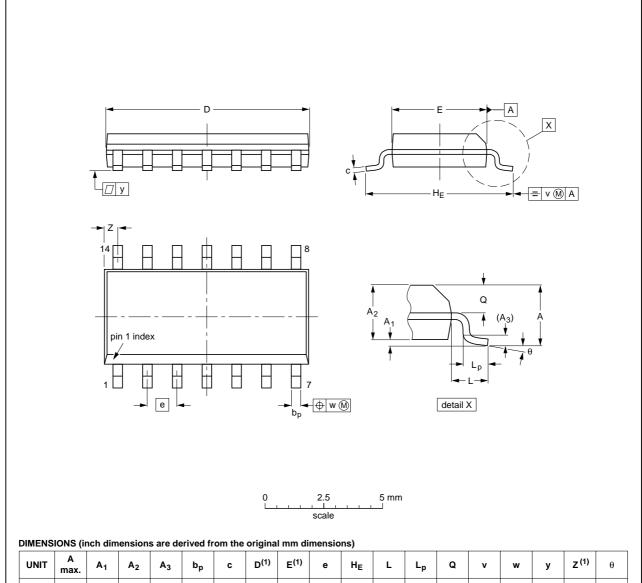
Table 9. Test data

Туре	Input		Load		S1 position			
	VI	t _r , t _f	CL	R _L	t _{PHL} , t _{PLH}	t _{PZH} , t _{PHZ}	t _{PZL} , t _{PLZ}	
74AHC126	V_{CC}	≤ 3.0 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}	
74AHCT126	3.0 V	≤ 3.0 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}	

12. Package outline

SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1



UNIT	A max.	A ₁	A ₂	A ₃	bp	С	D ⁽¹⁾	E ⁽¹⁾	е	HE	L	Lp	Q	v	w	у	z ⁽¹⁾	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	8.75 8.55	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8°
inches	0.069	0.010 0.004	0.057 0.049	0.01	1	0.0100 0.0075		0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	0°

Note

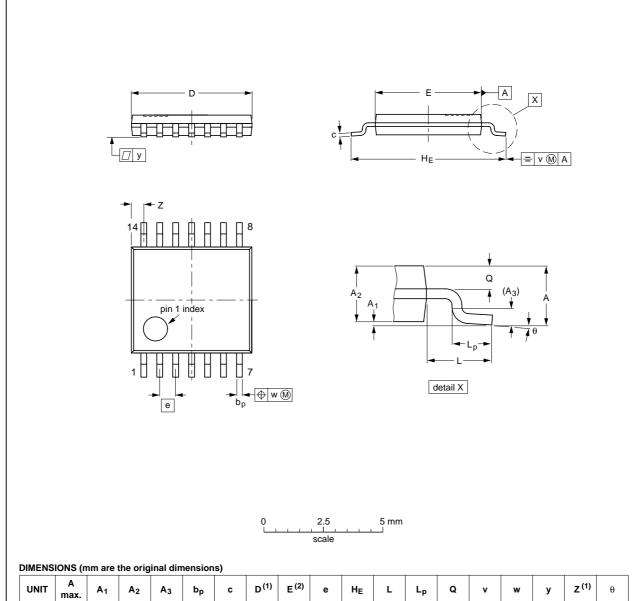
1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

OUTLINE		REFER	EUROPEAN	ISSUE DATE	
VERSION	IEC	JEDEC	JEITA	PROJECTION	ISSUE DATE
SOT108-1	076E06	MS-012			99-12-27 03-02-19

Fig 8. Package outline SOT108-1 (SO14)

TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm

SOT402-1



UNIT	A max.	A ₁	A ₂	A ₃	bp	С	D ⁽¹⁾	E ⁽²⁾	е	HE	L	Lp	Q	v	w	у	z ⁽¹⁾	θ
mm	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	5.1 4.9	4.5 4.3	0.65	6.6 6.2	1	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.72 0.38	8° 0°

Notes

- 1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
- 2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

	REFER	EUROPEAN	ISSUE DATE			
IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE	
	MO-153				99-12-27 03-02-18	
_	IEC	IEC JEDEC		IEC JEDEC JEITA	IEC JEDEC JEITA PROJECTION	

Fig 9. Package outline SOT402-1 (TSSOP14)

13. Abbreviations

Table 10. Abbreviations

Acronym	Description
CDM	Charged Device Model
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
LSTTL	Low-power Schottky Transistor-Transistor Logic
MM	Machine Model

14. Revision history

Table 11. Revision history

	•							
Document ID	Release date	Data sheet status	Change notice	Supersedes				
74AHC_AHCT126_3	20080425	Product data sheet	-	74AHC_AHCT126_2				
Modifications:	 The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. 							
	 Legal texts 	have been adapted to the new	w company name whe	ere appropriate.				
	• Table 6: the	conditions for input leakage	current have been cha	anged.				
74AHC_AHCT126_2	19990929	Product specification	-	74AHC_AHCT126_N_1				
74AHC_AHCT126_N_1	19990112	Preliminary specification	-	-				

15. Legal information

15.1 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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