Product data sheet

## 1. General description

The 74AHC1G126; 74AHCT1G126 is a single buffer/line driver with 3-state output. Inputs are overvoltage tolerant. This feature allows the use of these devices as translators in mixed voltage environments.

## 2. Features and benefits

- Symmetrical output impedance
- Balanced propagation delays
- Wide supply voltage range from 2.0 V 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
- - For 74AHC1G126: CMOS level
  - For 74AHCT1G126: TTL level
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Multiple package options
- Specified from -40 °C to +125 °C

# 3. Ordering information

#### **Table 1. Ordering information**

Type number	Package	Package									
	Temperature range	Name	Description	Version							
74AHC1G126GW 74AHCT1G126GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1							
74AHC1G126GV 74AHCT1G126GV	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	<u>SOT753</u>							
74AHC1G126GM 74AHCT1G126GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	<u>SOT886</u>							
74AHCT1G126GZ	-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							



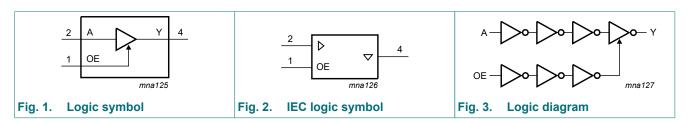
# 4. Marking

#### Table 2. Marking codes

Type number	Marking [1]
74AHC1G126GW	AN
74AHCT1G126GW	CN
74AHC1G126GV	A26
74AHCT1G126GV	C26
74AHC1G126GM	AN
74AHCT1G126GM	CN
74AHCT1G126GZ	CN

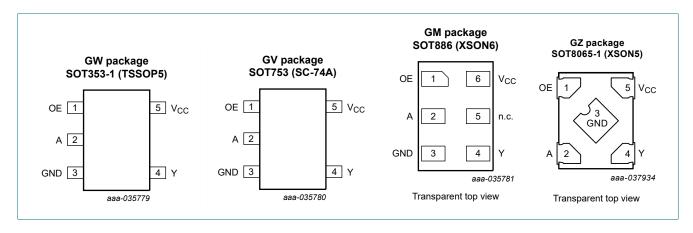
<sup>[1]</sup> The pin 1 indicator is located on the lower left corner of the device, below the marking code.

# 5. Functional diagram



# 6. Pinning information

## 6.1. Pinning



# 6.2. Pin description

Table 3. Pin description

Symbol	Pin		Description	
	SOT353-1, SOT753 and SOT8065-1	SOT886		
OE	1	1	output enable input	
A	2	2	data input A	
GND	3	3	ground (0 V)	
Υ	4	4	data output Y	
n.c.	-	5	not connected	
V <sub>CC</sub>	5	6	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 OE	nput				
OE	A	Υ			
Н	L	L			
Н	Н	Н			
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
$V_{CC}$	supply voltage		-0.5	+7.0	V
VI	input voltage		-0.5	+7.0	V
I <sub>IK</sub>	input clamping current	$V_{I} < -0.5 \text{ V}$ [1]	-20	-	mA
I <sub>OK</sub>	output clamping current	$V_O < -0.5 \text{ V or } V_O > V_{CC} + 0.5 \text{ V}$ [1]	-	±20	mA
Io	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
$I_{GND}$	ground current		-75	-	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	total power dissipation	$T_{amb} = -40  ^{\circ}\text{C} \text{ to } +125  ^{\circ}\text{C}$ [2]	-	250	mW

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

[2] For SOT353-1 (TSSOP5) package: Ptot 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 SOT886 (XSON6) package: Ptot derates linearly with 3.3 mW/K above 74 °C.

For SOT8065-1 (XSON5) package: Ptot 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	74	AHC1G1	26	74	Unit		
			Min	Тур	Max	Min	Тур	Max	
V <sub>CC</sub>	supply voltage		2.0	5.0	5.5	4.5	5.0	5.5	V
VI	input voltage		0	-	5.5	0	-	5.5	V
Vo	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	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$	-	-	100	-	-	-	ns/V
	fall rate	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 1	to +85 °C	-40 °C t	o +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
74AHC1	G126				'					
V <sub>IH</sub>	HIGH-level	V <sub>CC</sub> = 2.0 V	1.5	-	-	1.5	-	1.5	-	V
	input voltage	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	V <sub>CC</sub> = 2.0 V	-	-	0.5	-	0.5	-	0.5	V
	input voltage	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
O.,	HIGH-level	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>								
	output voltage	I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		$I_O = -50 \mu A; V_{CC} = 3.0 V$	2.9	3.0	-	2.9	-	2.9	-	V
		$I_{O}$ = -50 $\mu$ A; $V_{CC}$ = 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	$V_I = V_{IH}$ or $V_{IL}$								
	output voltage	$I_O = 50 \mu A; V_{CC} = 2.0 V$	-	0	0.1	-	0.1	-	0.1	V
		$I_{O} = 50 \mu A; V_{CC} = 3.0 V$	-	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
		$I_O = 8.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	-	0.36	-	0.44	-	0.55	V
I <sub>OZ</sub>	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	μA
l <sub>l</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	μΑ

Symbol	Parameter	Conditions		25 °C		-40 °C 1	to +85 °C	-40 °C t	o +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
I <sub>CC</sub>	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		-	3	10	-	10	-	10	pF
74AHCT	1G126				_					
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	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 4.5 \text{ V}$								
	output voltage	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	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 4.5 V$								
	output voltage	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
I <sub>OZ</sub>	OFF-state output current	$V_l = V_{lH}$ or $V_{lL}$ ; $V_O = V_{CC}$ or GND; $V_{CC} = 5.5 \text{ V}$	-	-	±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	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5 \text{ V}$	-	-	2.0	-	20	-	40	μA
ΔI <sub>CC</sub>	additional supply current	per input pin; $V_I = V_{CC} - 2.1 \text{ V};$ other inputs at $V_{CC}$ or GND; $I_O = 0 \text{ A}; V_{CC} = 4.5 \text{ V} \text{ to } 5.5 \text{ V}$	-	-	1.35	-	1.5	-	1.5	mA
C <sub>I</sub>	input capacitance		-	3	10	-	10	-	10	pF

# 11. Dynamic characteristics

### **Table 8. Dynamic characteristics**

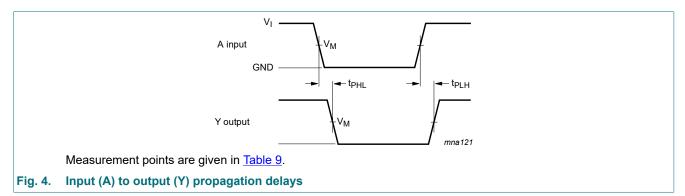
GND = 0 V; for test circuit see Fig. 6.

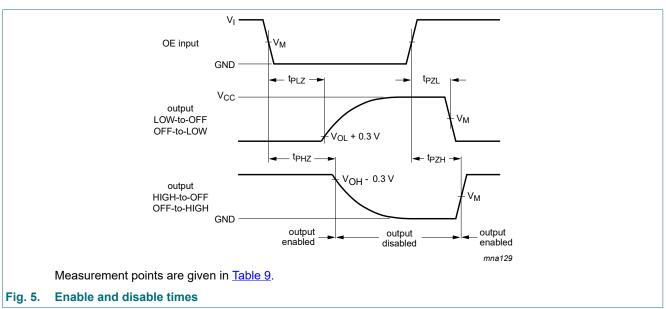
Symbol	Parameter	Conditions			25 °C		-40 °C	to +85 °C	-40 °C to +125 °C		Unit
				Min	Тур	Max	Min	Max	Min	Max	
74AHC1	G126						1				
t <sub>pd</sub>	propagation	A to Y; see Fig. 4	[1]								
	delay	V <sub>CC</sub> = 3.0 V to 3.6 V	[2]								
		C <sub>L</sub> = 15 pF		-	4.4	8.0	1.0	9.5	1.0	10.0	ns
		C <sub>L</sub> = 50 pF		-	6.3	11.5	1.0	13.0	1.0	14.5	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	[3]								
		C <sub>L</sub> = 15 pF		-	3.4	5.5	1.0	6.5	1.0	7.0	ns
		C <sub>L</sub> = 50 pF		-	4.7	7.5	1.0	8.5	1.0	9.5	ns
t <sub>en</sub>	enable time	OE to Y; see Fig. 5	[1]								
		V <sub>CC</sub> = 3.0 V to 3.6 V	[2]								
		C <sub>L</sub> = 15 pF		-	4.9	8.0	1.0	9.5	1.0	10.0	ns
		C <sub>L</sub> = 50 pF		-	7.0	11.5	1.0	13.0	1.0	14.5	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	[3]								
		C <sub>L</sub> = 15 pF		-	3.6	5.6	1.0	6.3	1.0	7.0	ns
		C <sub>L</sub> = 50 pF		-	5.4	8.0	1.0	9.0	1.0	9.5	ns
t <sub>dis</sub>	disable time	OE to Y; see Fig. 5	[1]								
		V <sub>CC</sub> = 3.0 V to 3.6 V	[2]								
		C <sub>L</sub> = 15 pF		-	6.3	9.7	1.0	11.5	1.0	12.5	ns
		C <sub>L</sub> = 50 pF		-	9.0	13.2	1.0	15.0	1.0	16.5	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	[3]								
		C <sub>L</sub> = 15 pF		-	4.3	6.8	1.0	8.0	1.0	8.5	ns
		C <sub>L</sub> = 50 pF		-	6.1	8.8	1.0	10.0	1.0	11.0	ns
C <sub>PD</sub>	power dissipation capacitance	per buffer; $C_L = 50 \text{ pF}$ ; f = 1  MHz; $V_I = \text{GND to } V_{CC}$	[4]	-	9	-	-	-	-	-	pF

Symbol	Parameter	Conditions			25 °C		-40 °C	to +85 °C	-40 °C to +125 °C		Unit
				Min	Тур	Max	Min	Max	Min	Max	
74AHCT	1G126									<u>'</u>	
t <sub>pd</sub>	propagation	A to Y; see Fig. 4	[1]								
	delay	V <sub>CC</sub> = 4.5 V to 5.5 V	[3]								
	C <sub>L</sub> = 15 pF		-	3.4	5.5	1.0	6.5	1.0	7.0	ns	
		C <sub>L</sub> = 50 pF		-	4.7	7.5	1.0	8.5	1.0	9.5	ns
t <sub>en</sub> e	enable time	OE to Y; see Fig. 5	[1]								
		V <sub>CC</sub> = 4.5 V to 5.5 V	[3]								
		C <sub>L</sub> = 15 pF		-	3.4	5.6	1.0	6.3	1.0	6.5	ns
		C <sub>L</sub> = 50 pF		-	4.8	8.0	1.0	9.0	1.0	9.0	ns
t <sub>dis</sub>	disable time	OE to Y; see Fig. 5	[1]								
		V <sub>CC</sub> = 4.5 V to 5.5 V	[3]								
		C <sub>L</sub> = 15 pF		-	4.0	6.8	1.0	8.0	1.0	8.5	ns
		C <sub>L</sub> = 50 pF		-	5.7	8.8	1.0	10.0	1.0	11.5	ns
C <sub>PD</sub>	power dissipation capacitance	per buffer; C <sub>L</sub> = 50 pF; f = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub>	[4]	-	11	-	-	-	-	-	pF

- [1]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .
  - $t_{\text{en}}$  is the same as  $t_{\text{PZL}}$  and  $t_{\text{PZH}}.$
- $t_{\rm dis}$  is the same as  $t_{\rm PLZ}$  and  $t_{\rm PHZ}$ . Typical values are measured at  $V_{\rm CC}$  = 3.3 V.
- [3] Typical values are measured at  $V_{CC} = 5.0 \text{ V}$ . [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<sub>i</sub> = input frequency in MHz;
  - $f_o$  = output frequency in MHz;
  - C<sub>L</sub> = output load capacitance in pF;
  - $V_{CC}$  = supply voltage in V.

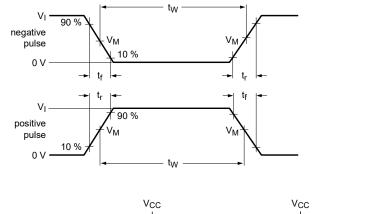
## 11.1. Waveforms and test circuit

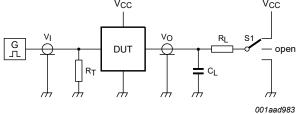




**Table 9. Measurement points** 

Туре	Input	Output	
	$V_{M}$	V <sub>I</sub>	V <sub>M</sub>
74AHC1G126	0.5 × V <sub>CC</sub>	GND to V <sub>CC</sub>	0.5 × V <sub>CC</sub>
74AHCT1G126	1.5 V	GND to 3.0 V	0.5 × V <sub>CC</sub>





Test data is given in Table 10.

Definitions test circuit:

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

C<sub>L</sub> = Load capacitance including jig and probe capacitance;

R<sub>L</sub> = Load resistance;

S1 = Test selection switch.

## Fig. 6. Test circuit for measuring switching times

Table 10. Test data

Туре	Input		Load		S1 position		
	V <sub>I</sub>	t <sub>r</sub> , t <sub>f</sub>	CL	R <sub>L</sub>	t <sub>PHL</sub> , t <sub>PLH</sub>	t <sub>PZH</sub> , t <sub>PHZ</sub>	t <sub>PZL</sub> , t <sub>PLZ</sub>
74AHC1G126	V <sub>CC</sub>	≤ 3 ns	15 pF, 50 pF	1 kΩ	open	GND	V <sub>CC</sub>
74AHCT1G126	3 V	≤ 3 ns	15 pF, 50 pF	1 kΩ	open	GND	V <sub>CC</sub>

# 12. Package outline

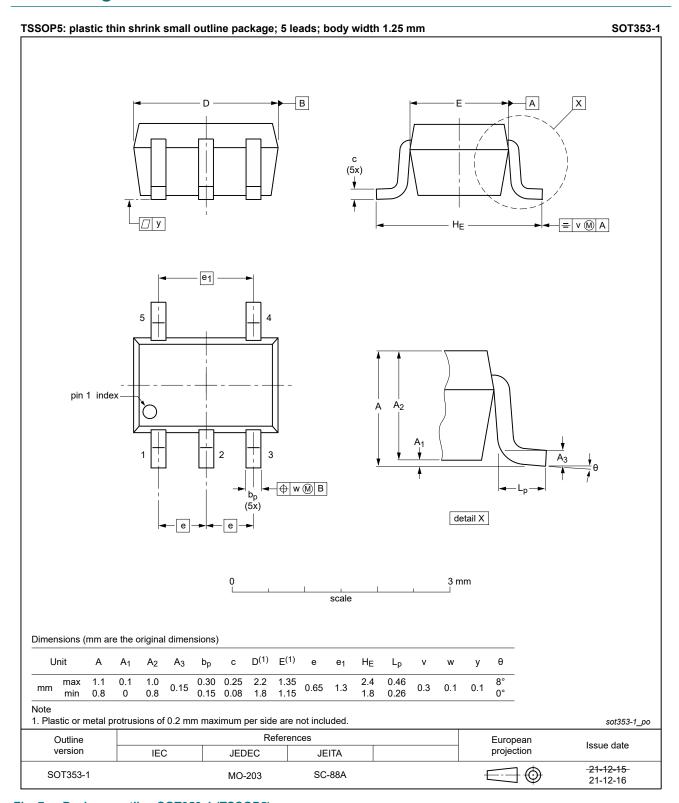
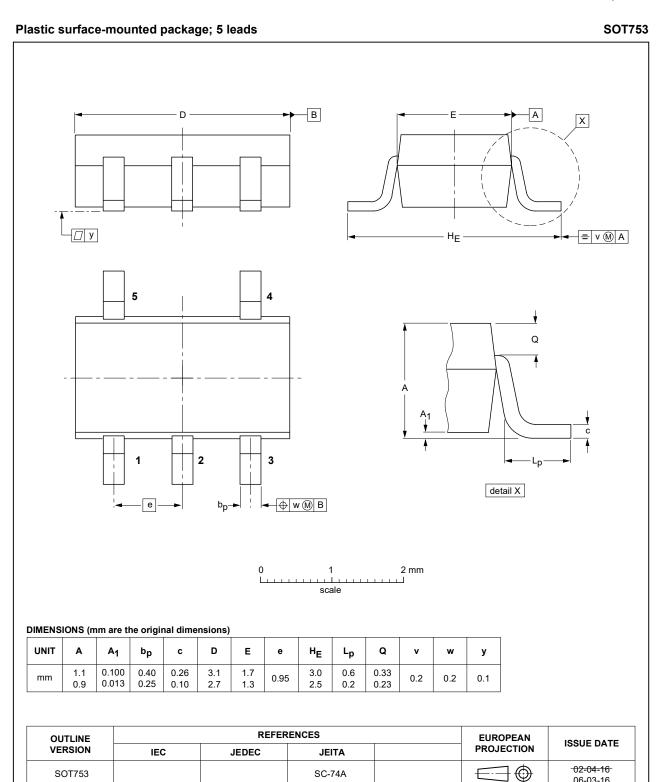


Fig. 7. Package outline SOT353-1 (TSSOP5)



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

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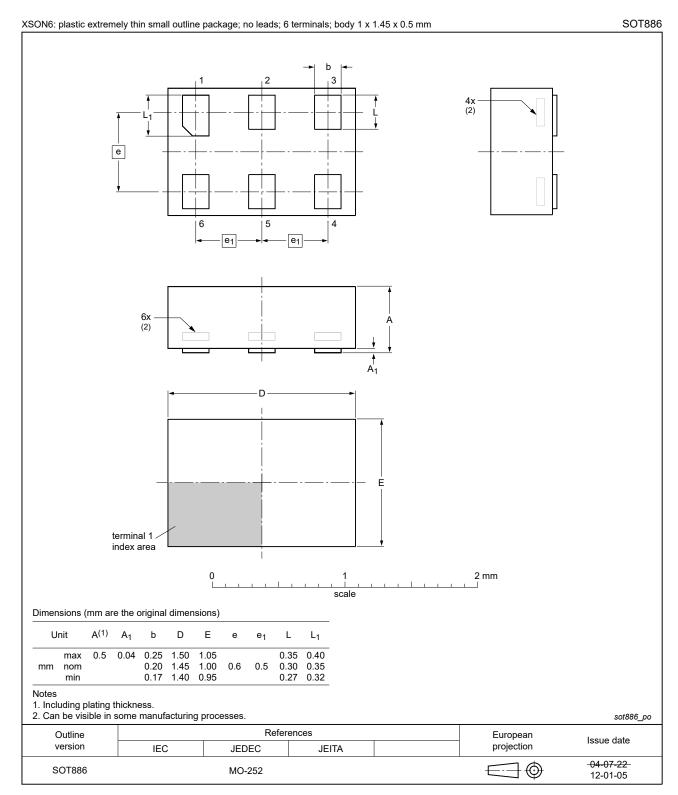


Fig. 9. Package outline SOT886 (XSON6)

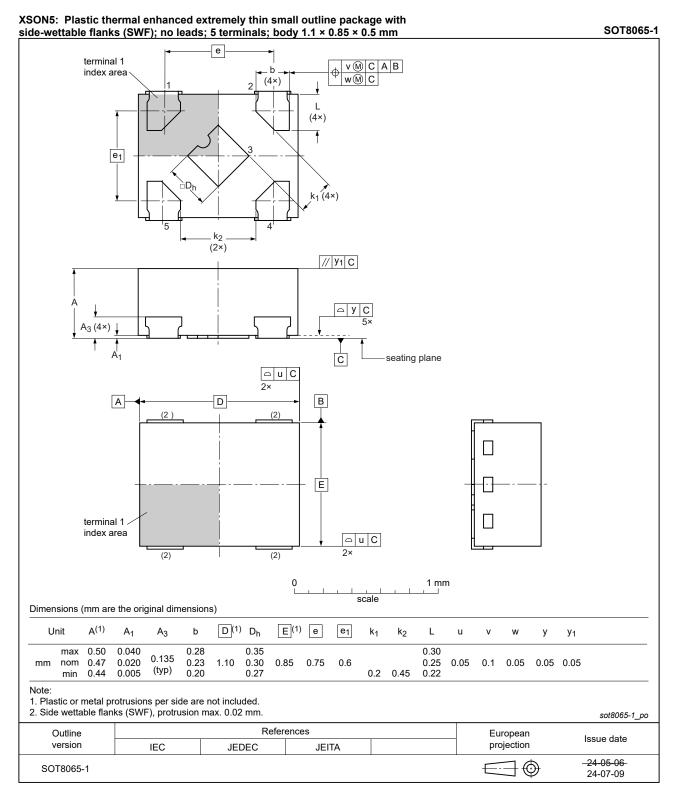


Fig. 10. Package outline SOT8065-1 (XSON5)

# 13. Abbreviations

#### **Table 11. Abbreviations**

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

# 14. Revision history

## **Table 12. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes	
74AHC_AHCT1G126 v.12	20240715	Product data sheet	-	74AHC_AHCT1G126 v.11	
Modifications:	Type number 74AHCT1G126 (SOT8065-1/XSON5) added.				
74AHC_AHCT1G126 v.11	20230912	Product data sheet	-	74AHC_AHCT1G126 v.10	
Modifications:	<u>Section 2</u> : ESD specification updated according to the latest JEDEC standard.				
74AHC_AHCT1G126 v.10	20220111	Product data sheet	-	74AHC_AHCT1G126 v.9	
Modifications:	Fig. 7: Package outline drawing for SOT353-1 (TSSOP5) has changed.				
74AHC_AHCT1G126 v.9	20210518	Product data sheet	-	74AHC_AHCT1G126 v.8	
	<ul> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Type numbers 74AHC1G126GF and 74AHCT1G126GF (SOT891 / XSON6) removed</li> <li>Section 1 and Section 2 updated.</li> <li>Section 8: Derating values for P<sub>tot</sub> total power dissipation updated.</li> </ul>				
74AHC_AHCT1G126 v.8	20120823	Product data sheet	-	74AHC_AHCT1G126 v.7	
Modifications:	Package outline drawing of SOT886 ( <u>Fig. 9</u> ) modified.				
74AHC_AHCT1G126 v.7	20090617	Product data sheet	-	74AHC_AHCT1G126 v.6	
74AHC_AHCT1G126 v.6	20070525	Product data sheet	-	74AHC_AHCT1G126 v.5	
74AHC_AHCT1G126 v.5	20070514	Product data sheet	-	74AHC_AHCT1G126 v.4	
74AHC_AHCT1G126 v.4	20020606	Product specification	-	74AHC_AHCT1G126 v.3	
74AHC_AHCT1G126 v.3	20020215	Product specification	-	74AHC_AHCT1G126 v.2	
74AHC_AHCT1G126 v.2	20010406	Product specification	-	74AHC1G_AHCT1G126 v.1	
74AHC1G_AHCT1G126 v.1	19990920	Product specification	-	-	

## 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.

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

#### **Definitions**

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