

# 74AHC1G126; 74AHCT1G126

Bus buffer/line driver; 3-state

Rev. 8 — 23 August 2012

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 and benefits

- Symmetrical output impedance
- High noise immunity
- Low power dissipation
- Balanced propagation delays
- Multiple package options
- ESD protection:
  - ◆ HBM JESD22-A114F: exceeds 2000 V
  - ◆ MM JESD22-A115-A: exceeds 200 V
  - ◆ CDM JESD22-C101E: exceeds 1000 V
- Specified from -40 °C to +125 °C

## 3. Ordering information

Table 1. Ordering information

Type number	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	SOT753
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	SOT886
74AHC1G126GF 74AHCT1G126GF	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1 × 0.5 mm	SOT891

## 4. Marking

Table 2. Marking codes

Type number	Marking <sup>[1]</sup>
74AHC1G126GW	AN
74AHCT1G126GW	CN
74AHC1G126GV	A26
74AHCT1G126GV	C26
74AHC1G126GM	AN
74AHCT1G126GM	CN
74AHC1G126GF	AN
74AHCT1G126GF	CN

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

## 5. Functional diagram



*mna125*

**Fig 1. Logic symbol**



*mna126*

**Fig 2. IEC logic symbol**



*mna127*

**Fig 3. Logic diagram**

## 6. Pinning information

### 6.1 Pinning



**74AHC1G126**  
**74AHCT1G126**

*001aaf096*

**Fig 4. Pin configuration SOT353-1 and SOT753**



**74AHC1G126**  
**74AHCT1G126**

*001aak257*

Transparent top view

**Fig 5. Pin configuration SOT886**



**74AHC1G126**  
**74AHCT1G126**

*001aak258*

Transparent top view

**Fig 6. Pin configuration SOT891**

## 6.2 Pin description

Table 3. Pin description

Symbol	Pin		Description
	SOT353-1/SOT753	SOT886/SOT891	
OE	1	1	output enable input
A	2	2	data input A
GND	3	3	ground (0 V)
Y	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		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	[1] -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	[1] -	±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	[2] -	250	mW

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

[2] For TSSOP5 and SC-74A packages: above 87.5 °C the value of P<sub>tot</sub> derates linearly with 4.0 mW/K.  
For XSON6 packages: above 118 °C the value of P<sub>tot</sub> derates linearly with 7.8 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>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

**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	
C <sub>I</sub>	input capacitance		-	3	10	-	10	-	10	pF
<b>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
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
ΔI <sub>CC</sub>	additional supply current	per input pin; V <sub>I</sub> = V <sub>CC</sub> – 2.1 V; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 4.5 V to 5.5 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 [Figure 9](#).

Symbol	Parameter	Conditions	25 °C			–40 °C to +85 °C		–40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
<b>74AHC1G126</b>										
t <sub>pd</sub>	propagation delay	A to Y; see <a href="#">Figure 7</a>								
		V <sub>CC</sub> = 3.0 V to 3.6 V								
		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								
		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

**Table 8. Dynamic characteristics ...continued**  
*GND = 0 V; For test circuit see Figure 9.*

Symbol	Parameter	Conditions	25 °C			−40 °C to +85 °C		−40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t <sub>en</sub>	enable time	OE to Y; see Figure 8 <a href="#">[1]</a>								
		V <sub>CC</sub> = 3.0 V to 3.6 V <a href="#">[2]</a>								
		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 <a href="#">[3]</a>								
		C <sub>L</sub> = 15 pF	-	3.6	5.6	1.0	6.3	1.0	7.0	ns
t <sub>dis</sub>	disable time	OE to Y; see Figure 8 <a href="#">[1]</a>								
		V <sub>CC</sub> = 3.0 V to 3.6 V <a href="#">[2]</a>								
		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 <a href="#">[3]</a>								
		C <sub>L</sub> = 15 pF	-	4.3	6.8	1.0	8.0	1.0	8.5	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> <a href="#">[4]</a>	-	9	-	-	-	-	-	pF
		C <sub>L</sub> = 50 pF	-	6.1	8.8	1.0	10.0	1.0	11.0	ns
<b>74AHCT1G126</b>										
t <sub>pd</sub>	propagation delay	A to Y; see Figure 7 <a href="#">[1]</a>								
		V <sub>CC</sub> = 4.5 V to 5.5 V <a href="#">[3]</a>								
		C <sub>L</sub> = 15 pF	-	3.4	5.5	1.0	6.5	1.0	7.0	ns
t <sub>en</sub>	enable time	OE to Y; see Figure 8 <a href="#">[1]</a>								
		V <sub>CC</sub> = 4.5 V to 5.5 V <a href="#">[3]</a>								
		C <sub>L</sub> = 15 pF	-	3.4	5.6	1.0	6.3	1.0	6.5	ns
t <sub>dis</sub>	disable time	OE to Y; see Figure 8 <a href="#">[1]</a>								
		V <sub>CC</sub> = 4.5 V to 5.5 V <a href="#">[3]</a>								
		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

**Table 8. Dynamic characteristics ...continued**

$GND = 0\text{ V}$ ; For test circuit see [Figure 9](#).

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; $C_L = 50\text{ pF}$ ; $f = 1\text{ MHz}$ ; $V_I = GND\text{ to }V_{CC}$	[4] -	11	-	-	-	-	-	pF

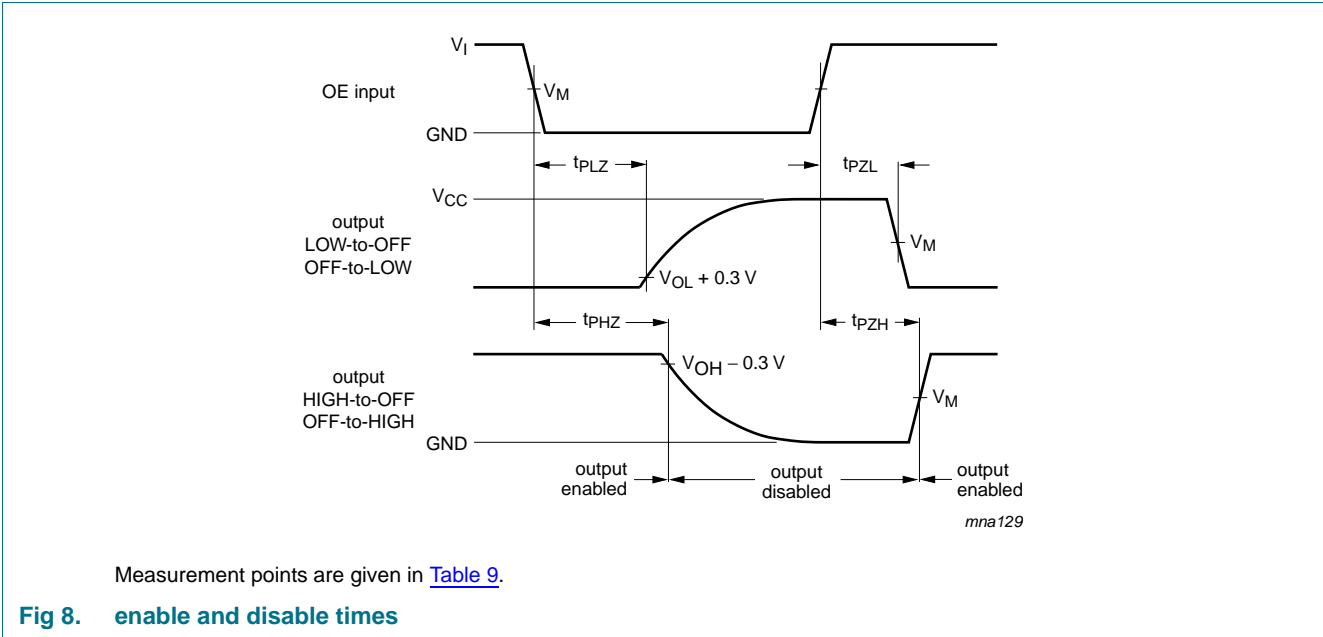
- [1]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .  
 $t_{en}$  is the same as  $t_{PZL}$  and  $t_{PZH}$ .  
 $t_{dis}$  is the same as  $t_{PLZ}$  and  $t_{PHZ}$ .
- [2] Typical values are measured at  $V_{CC} = 3.3\text{ V}$ .
- [3] Typical values are measured at  $V_{CC} = 5.0\text{ V}$ .
- [4]  $C_{PD}$  is used to determine the dynamic power dissipation  $P_D$  ( $\mu\text{W}$ ).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum(C_L \times V_{CC}^2 \times f_o)$  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 7. Input (A) to output (Y) propagation delays**



**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	$0.5 \times V_{CC}$





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.

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

$R_L$  = Load resistance.

S1 = Test selection switch.

**Fig 9. Test circuit for measuring switching times**

**Table 10. Test data**

Type	Input		Load		S1 position		
	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
74AHC1G126	$V_{CC}$	$\leq 3$ ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$
74AHCT1G126	3 V	$\leq 3$ ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$

## 13. Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm

SOT353-1



Fig 10. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753



Fig 11. Package outline SOT753 (SC-74A)

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm

SOT886



Fig 12. Package outline SOT886 (XSON6)

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1 x 0.5 mm

SOT891

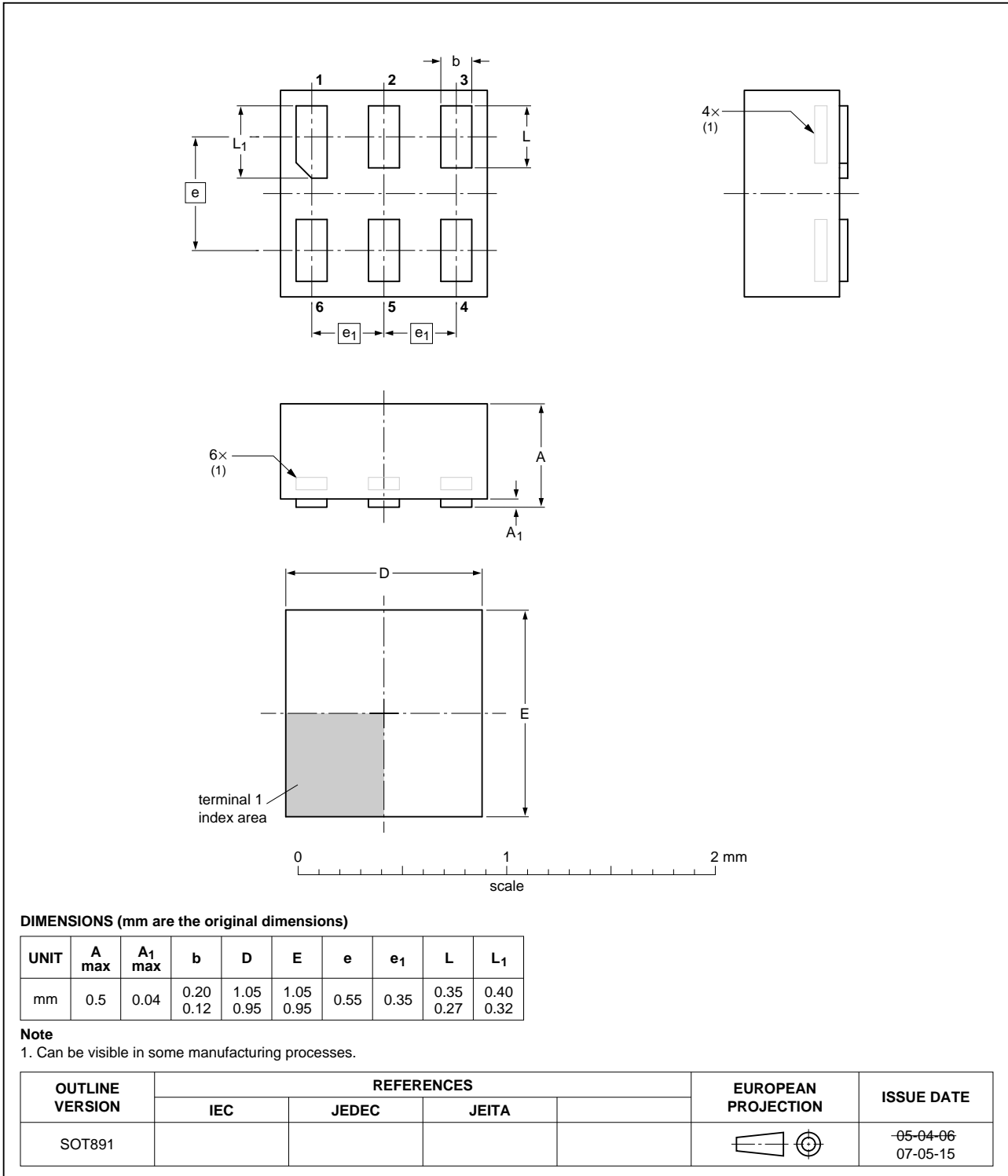


Fig 13. Package outline SOT891 (XSON6)

## 14. Abbreviations

Table 11. Abbreviations

Acronym	Description
CMOS	Complementary Metal Oxide Semiconductor
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 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AHC_AHCT1G126 v.8	20120823	Product data sheet	-	74AHC_AHCT1G126 v.7
Modifications:	<ul style="list-style-type: none"> <li>Package outline drawing of SOT886 (<a href="#">Figure 12</a>) modified.</li> </ul>			
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	-	-

## 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.nexperia.com>.

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For more information, please visit: <http://www.nexperia.com>

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