Bus buffer/line driver; 3-state Rev. 10 — 23 August 2012

Product data sheet

1. General description

74AHC1G125 and 74AHCT1G125 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 (\overline{OE}). A HIGH at \overline{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	Package									
	Temperature range	Name	Description	Version							
74AHC1G125GW	–40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package;	SOT353-1							
74AHCT1G125GW			5 leads; body width 1.25 mm								
74AHC1G125GV	–40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753							
74AHCT1G125GV											
74AHC1G125GM	–40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no	SOT886							
74AHCT1G125GM			leads; 6 terminals; body $1 \times 1.45 \times 0.5$ mm								
74AHC1G125GF	–40 °C to +125 °C	XSON6	plastic extremely thin small outline package;	SOT891							
74AHCT1G125GF			no leads; 6 terminals; body $1 \times 1 \times 0.5$ mm								



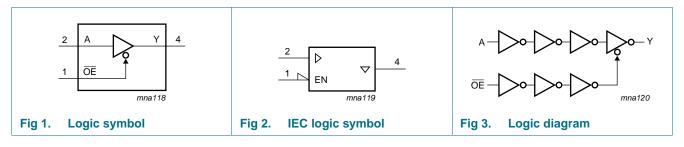
Bus buffer/line driver; 3-state

4. Marking

Table 2. Marking codes	
Type number	Marking ^[1]
74AHC1G125GW	AM
74AHCT1G125GW	СМ
74AHC1G125GV	A25
74AHCT1G125GV	C25
74AHC1G125GM	AM
74AHCT1G125GM	СМ
74AHC1G125GF	AM
74AHCT1G125GF	СМ

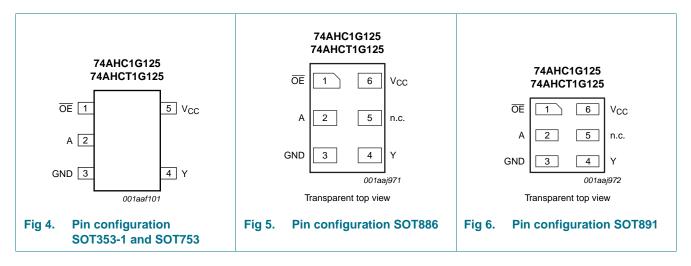
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram



6. Pinning information

6.1 Pinning



74AHC_AHCT1G125

Bus buffer/line driver; 3-state

6.2 Pin description

Table 3. Pi	n description		
Symbol	Pin		Description
	SOT353-1/SOT753	SOT886/SOT891	
OE	1	1	output enable input
A	2	2	data input
GND	3	3	ground (0 V)
Y	4	4	data output
n.c.	-	5	not connected
V _{CC}	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

Inputs	Inputs OE A				
OE	A	Y			
L	L	L			
L	н	Н			
Н	Х	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 _{IK}	input clamping current	V _I < -0.5 V	<u>[1]</u> –20	-	mA
I _{OK}	output clamping current	$V_{\rm O}$ < –0.5 V or $V_{\rm O}$ > $V_{\rm CC}$ + 0.5 V	<u>[1]</u> _	±20	mA
lo	output current	$-0.5 \text{ V} < \text{V}_{\text{O}} < \text{V}_{\text{CC}} + 0.5 \text{ V}$	-	±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	$T_{amb} = -40 \ ^{\circ}C \ to +125 \ ^{\circ}C$	[2] _	250	mW

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

Bus buffer/line driver; 3-state

9. Recommended operating conditions

Table 6. Recommended operating conditions

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

Symbol	Parameter	Conditions	74	AHC1G1	25	74AHCT1G125			Unit
			Min	Тур	Max	Min	Тур	Max	
V _{CC}	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_{CC}	0	-	V_{CC}	V
T _{amb}	ambient temperature		-40	+25	+125	-40	+25	+125	°C
$\Delta t / \Delta V$	input transition rise	V_{CC} = 3.3 V \pm 0.3 V	-	-	100	-	-	-	ns/V
	and fall rate	$V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$	-	-	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 t	to +85 °C	–40 °C t	o +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
74AHC1	G125									
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 _{ОН}	HIGH-level	$V_{I} = V_{IH} \text{ or } V_{IL}$								
	output voltage	$I_0 = -50 \ \mu A; \ V_{CC} = 2.0 \ V$	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
		$I_O = -50 \ \mu\text{A}; \ V_{CC} = 4.5 \ \text{V}$	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	-	-	3.8	-	3.70	-	V
V _{OL}	LOW-level	$V_{I} = V_{IH} \text{ or } V_{IL}$								
	output voltage	$I_0 = 50 \ \mu A; \ V_{CC} = 2.0 \ V$	-	0	0.1	-	0.1	-	0.1	V
		$I_0 = 50 \ \mu A; \ V_{CC} = 3.0 \ V$	-	0	0.1	-	0.1	-	0.1	V
		$I_0 = 50 \ \mu A; \ V_{CC} = 4.5 \ V$	-	0	0.1	-	0.1	-	0.1	V
		$I_0 = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.36	-	0.44	-	0.55	V
		I_{O} = 8.0 mA; V_{CC} = 4.5 V	-	-	0.36	-	0.44	-	0.55	V
I _{OZ}	OFF-state output current	$V_I = V_{CC} \text{ or GND};$ $V_{CC} = 5.5 \text{ V}$	-	-	0.25	-	2.5	-	10	μΑ
lı	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
I _{CC}	supply current	$\label{eq:VI} \begin{array}{l} V_{I} = V_{CC} \text{ or GND}; \ I_{O} = 0 \ A; \\ V_{CC} = 5.5 \ V \end{array}$	-	-	1.0	-	10	-	40	μΑ

Bus buffer/line driver; 3-state

Symbol	Parameter	Conditions	25 °C			–40 °C to +85 °C		–40 °C 1	to +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	1
CI	input capacitance		-	1.5	10	-	10	-	10	pF
74AHCT	1G125									
V _{IH}	HIGH-level input voltage	V_{CC} = 4.5 V to 5.5 V	2.0	-	-	2.0	-	2.0	-	V
V _{IL}	LOW-level input voltage	V_{CC} = 4.5 V to 5.5 V	-	-	0.8	-	0.8	-	0.8	V
V _{OH}	HIGH-level	$V_{I} = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$								
	output voltage	I _O = -50 μA	4.4	4.5	-	4.4	-	4.4	-	V
		I _O = -8.0 mA	3.94	-	-	3.8	-	3.70	-	V
V _{OL}	DL LOW-level	$V_{I} = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$								
	output voltage	I _O = 50 μA	-	0	0.1	-	0.1	-	0.1	V
		I _O = 8.0 mA	-	-	0.36	-	0.44	-	0.55	V
I _{OZ}	OFF-state output current	$V_I = V_{CC} \text{ or GND};$ $V_{CC} = 5.5 \text{ V}$	-	-	0.25	-	2.5	-	10	μΑ
lı	input leakage current	$V_1 = 5.5 V \text{ or GND};$ $V_{CC} = 0 V \text{ to } 5.5 V$	-	-	0.1	-	1.0	-	2.0	μΑ
I _{CC}	supply current		-	-	1.0	-	10	-	40	μΑ
ΔI_{CC}	additional supply current	per input pin; $V_I = 3.4 V$; other inputs at V_{CC} or GND; $I_O = 0 A$; $V_{CC} = 5.5 V$	-	-	1.35	-	1.5	-	1.5	mA
CI	input capacitance		-	1.5	10	-	10	-	10	pF

11. Dynamic characteristics

Table 8.Dynamic characteristics

GND = 0 V; For test circuit see <u>Figure 9</u>.

Symbol	Parameter	Conditions			25 °C		–40 °C	to +85 °C	–40 °C to +125 °C		Unit
				Min	Тур	Max	Min	Max	Min	Max	
74AHC1	G125										
t _{pd}	propagation delay	A to Y; see Figure 7	[1]								
		V_{CC} = 3.0 V to 3.6 V	[2]								
		C _L = 15 pF		-	4.7	8.0	1.0	9.5	1.0	11.5	ns
		C _L = 50 pF		-	6.6	11.5	1.0	13.0	1.0	14.5	ns
		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		-	4.8	7.5	1.0	8.5	1.0	9.5	ns

Bus buffer/line driver; 3-state

Symbol	Parameter	Conditions			25 °C		-40 °C 1	to +85 °C	–40 °C to +125 °C		Uni
				Min	Тур	Max	Min	Max	Min	Max	
en	enable time	OE to Y; see Figure 8	<u>[1]</u>								
		V_{CC} = 3.0 V to 3.6 V	[2]								
		C _L = 15 pF		-	5.0	8.0	1.0	9.5	1.0	11.5	ns
		C _L = 50 pF		-	6.9	11.5	1.0	13.0	1.0	14.5	ns
		V_{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	3.6	5.1	1.0	6.0	1.0	6.5	ns
		C _L = 50 pF		-	4.9	7.5	1.0	8.5	1.0	9.5	ns
dis	disable time	OE to Y; see Figure 8	[1]								
		$V_{CC} = 3.0 \text{ V} \text{ to } 3.6 \text{ V}$	[2]								
		C _L = 15 pF		-	6.0	9.7	1.0	11.5	1.0	12.5	ns
		C _L = 50 pF		-	8.3	13.2	1.0	15.0	1.0	16.5	ns
		V_{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	4.1	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	11.0	ns
C _{PD}	power dissipation capacitance	per buffer; $C_L = 50 \text{ pF}; \text{ f} = 1 \text{ MHz};$ $V_I = \text{GND to } V_{CC}$	<u>[4]</u>	-	9	-	-	-	-	-	pF
74AHCT	1G125										
pd	propagation	A to Y; see Figure 7	[1]								
	delay	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		-	4.8	7.5	1.0	8.5	1.0	9.5	ns
en	enable time	OE to Y; see Figure 8	[1]								
		V_{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	3.9	5.1	1.0	6.0	1.0	6.5	ns
		C _L = 50 pF		-	5.1	7.5	1.0	8.5	1.0	9.5	ns
dis	disable time	OE to Y; see Figure 8	[1]								
		V_{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	4.5	6.8	1.0	8.0	1.0	8.5	ns
		$C_{1} = 50 \text{ pF}$		-	6.1	8.8	1.0	10.0	1.0	11.0	ns

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

Bus buffer/line driver; 3-state

Symbol	Parameter	Conditions		25 °C -		–40 °C to +85 °C		–40 °C to +125 °C		Un	
				Min	Тур	Max	Min	Max	Min	Max	
C _{PD}	•	per buffer; $C_L = 50 \text{ pF}; f = 1 \text{ MHz};$ $V_I = \text{GND to } V_{CC}$	<u>[4]</u>	-	11	-	-	-	-	-	pF

Table 8. Dynamic characteristics ...continued

 t_{dis} is the same as t_{PLZ} and $t_{\text{PHZ}}.$

[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 (μ W).

 $\mathsf{P}_{\mathsf{D}} = \mathsf{C}_{\mathsf{PD}} \times \mathsf{V}_{\mathsf{CC}}{}^2 \times \mathsf{f}_i + \sum (\mathsf{C}_{\mathsf{L}} \times \mathsf{V}_{\mathsf{CC}}{}^2 \times \mathsf{f}_o)$ where:

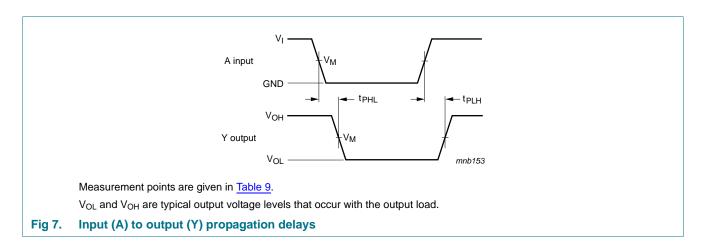
 f_i = input frequency in MHz;

 f_o = output frequency in MHz;

 C_L = output load capacitance in pF;

V_{CC} = supply voltage in Volts.

12. Waveforms



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74AHC1G125; 74AHCT1G125

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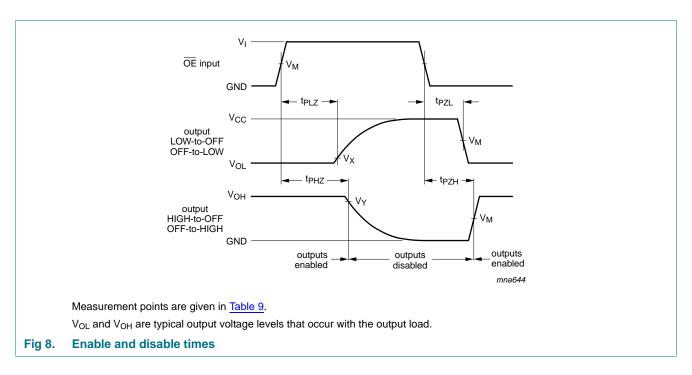


Table 9. Measurement point

Туре	Inputs			Output				
	VI	V _M	V _M	V _X	V _Y			
74AHC1G125	GND to V _{CC}	0.5V _{CC}	0.5V _{CC}	V _{OL} + 0.3 V	V _{OH} – 0.3 V			
74AHCT1G125	GND to 3.0 V	1.5 V	0.5V _{CC}	V _{OL} + 0.3 V	V _{OH} – 0.3 V			

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74AHC1G125; 74AHCT1G125

Bus buffer/line driver; 3-state

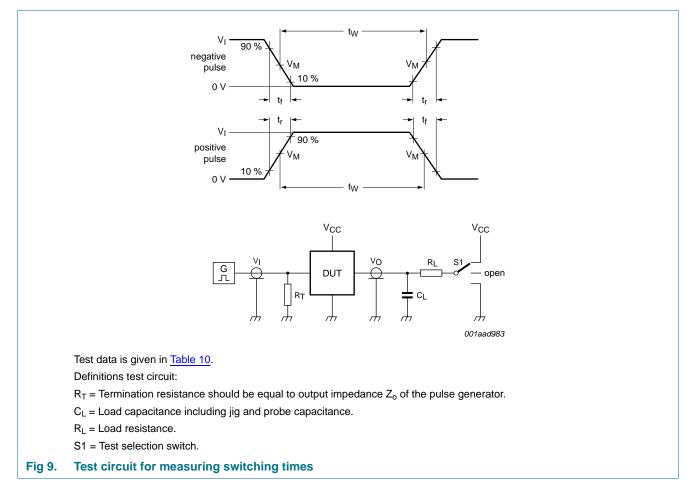


Table 10. Test data

Туре	Input		Load		S1 position		
	VI	t _r , t _f	CL	RL	t _{PHL} , t _{PLH}	t _{PZH} , t _{PHZ}	t _{PZL} , t _{PLZ}
74AHC1G125	V _{CC}	≤ 3 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}
74AHCT1G125	3 V	\leq 3 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}

Bus buffer/line driver; 3-state

13. Package outline

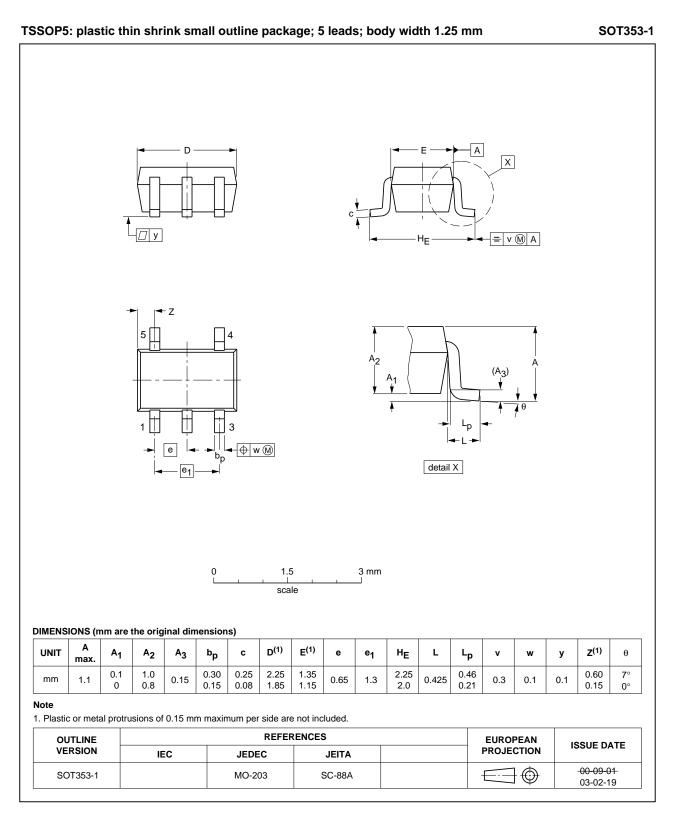


Fig 10. Package outline SOT353-1 (TSSOP5)

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Product data sheet

Bus buffer/line driver; 3-state

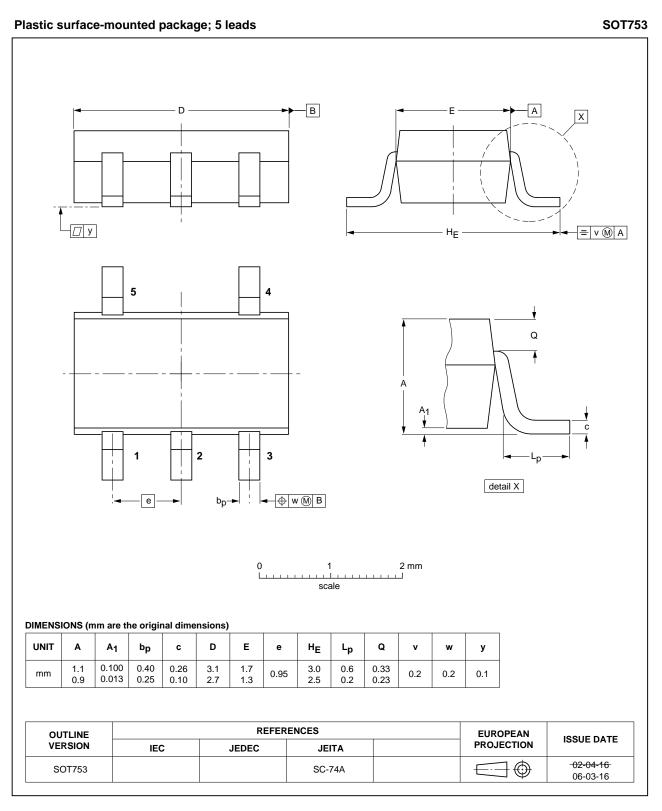


Fig 11. Package outline SOT753 (SC-74A)

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Bus buffer/line driver; 3-state

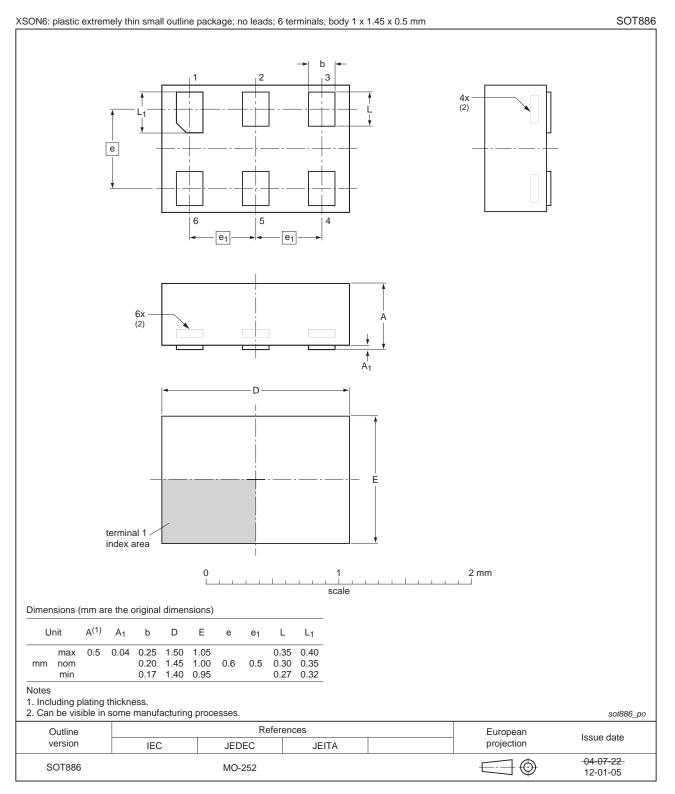


Fig 12. Package outline SOT886 (XSON6)

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Product data sheet

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Bus buffer/line driver; 3-state

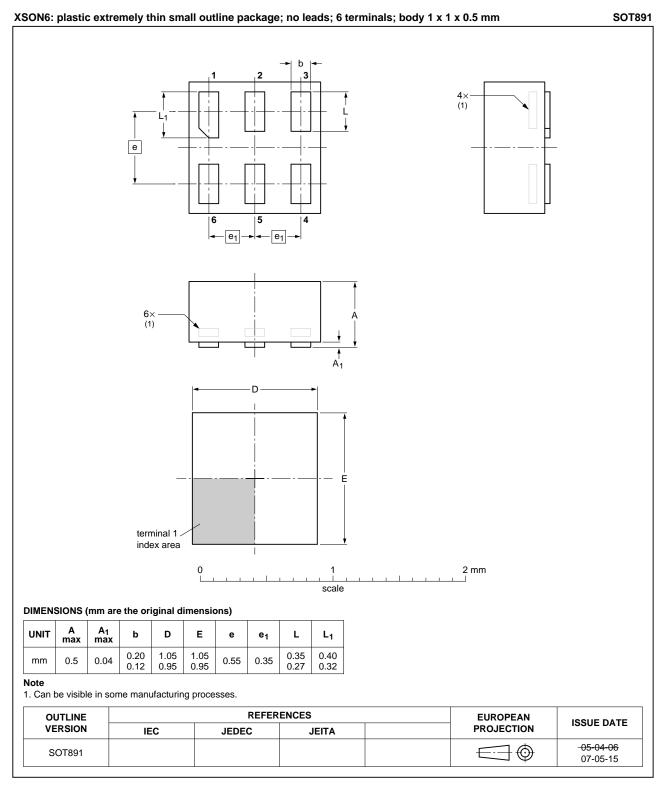


Fig 13. Package outline SOT891 (XSON6)

74AHC_AHCT1G125
Product data sheet

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Bus buffer/line driver; 3-state

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_AHCT1G125 v10	20120823	Product data sheet	-	74AHC_AHCT1G125 v.9
Modifications:	 Package out 	line drawing of SOT886 (Figure	<u>e 12</u>) modifie	ed.
74AHC_AHCT1G125 v.9	20090622	Product data sheet	-	74AHC_AHCT1G125 v.8
74AHC_AHCT1G125 v.8	20090409	Product data sheet	-	74AHC_AHCT1G125 v.7
74AHC_AHCT1G125 v.7	20070707	Product data sheet	-	74AHC_AHCT1G125 v.6
74AHC_AHCT1G125 v.6	20020606	Product specification	-	74AHC_AHCT1G125 v.5
74AHC_AHCT1G125 v.5	20020322	Product specification	-	74AHC_AHCT1G125 v.4
74AHC_AHCT1G125 v.4	20010222	Product specification	-	74AHC_AHCT1G125 v.3
74AHC_AHCT1G125 v.3	19990615	Product specification	-	74AHC_AHCT1G125_N v.2
74AHC_AHCT1G125_N v.2	19981207	Preliminary specification	-	74AHC_AHCT1G125_N v.1
74AHC_AHCT1G125_N v.1	19981125	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.nexperia.com.

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Bus buffer/line driver; 3-state

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Product data sheet

Bus buffer/line driver; 3-state

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