



# 74AHC1G125; 74AHCT1G125

Bus buffer/line driver; 3-state

Rev. 15.1 — 28 August 2024

Product data sheet

## 1. General description

The 74AHC1G125/74AHCT1G125 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

- Wide supply voltage range from 2.0 V to 5.5 V
- Overvoltage tolerant inputs to 5.5 V
- High noise immunity
- Symmetrical output impedance
- CMOS low power dissipation
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level A
- Balanced propagation delays
- Multiple package options
- Input levels:
  - For 74AHC1G125: CMOS level
  - For 74AHCT1G125: 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
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

## 3. Ordering information

Table 1. Ordering information

Type number	Package				Version
	Temperature range	Name	Description		
74AHC1G125GW 74AHCT1G125GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm		<a href="#">SOT353-1</a>
74AHC1G125GV 74AHCT1G125GV	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads		<a href="#">SOT753</a>
74AHC1G125GM 74AHCT1G125GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm		<a href="#">SOT886</a>
74AHC1G125GZ	-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		<a href="#">SOT8065-1</a>

**nexperia**

## 4. Marking

Table 2. Marking codes

Type number	Marking [1]
74AHC1G125GW	AM
74AHCT1G125GW	CM
74AHC1G125GV	A25
74AHCT1G125GV	C25
74AHC1G125GM	AM
74AHCT1G125GM	CM
74AHC1G125GZ	AM

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

## 5. Functional diagram

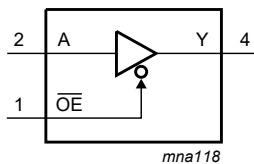


Fig. 1. Logic symbol

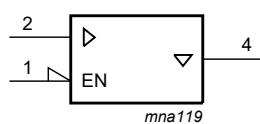


Fig. 2. IEC logic symbol

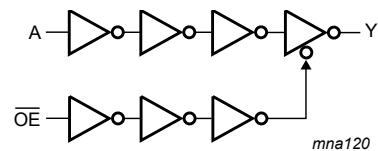
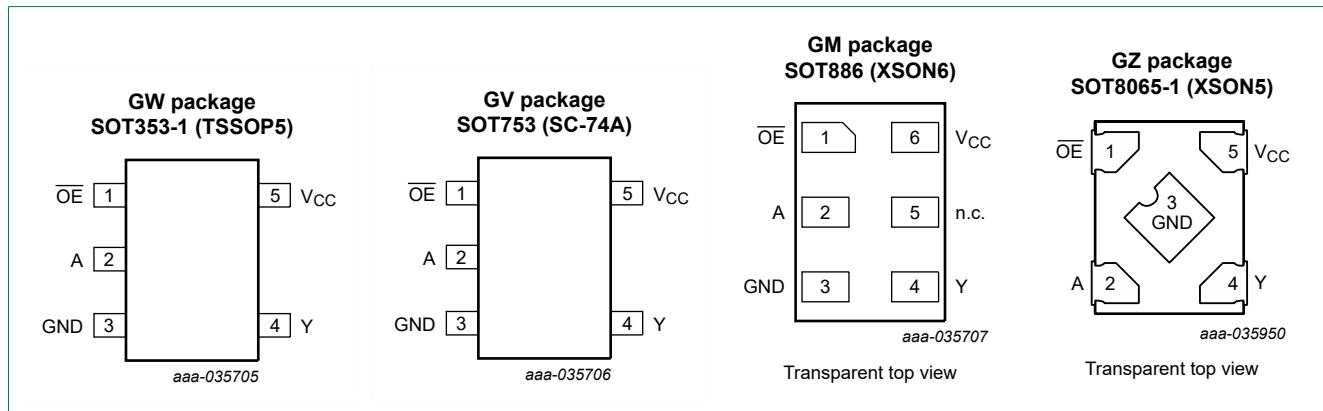


Fig. 3. Logic diagram

## 6. Pinning information

### 6.1. Pinning



## 6.2. Pin description

**Table 3. Pin description**

Symbol	Pin	Description	
		SOT353-1, SOT753, SOT8065-1	SOT886
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 <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.

Inputs		Output
OE	A	Y
L	L	L
L	H	H
H	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 SOT353-1 (TSSOP5) package: P<sub>tot</sub> derates linearly with 3.3 mW/K above 74 °C.

For SOT753 (SC-74A) package: P<sub>tot</sub> derates linearly with 3.8 mW/K above 85 °C.

For SOT886 (XSON6) package: P<sub>tot</sub> derates linearly with 3.3 mW/K above 74 °C.

For SOT8065-1 (XSON5) package: P<sub>tot</sub> 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	74AHC1G125			74AHCT1G125			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>74AHC1G125</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>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	-	-	1.0	-	10	-	40	μA
C <sub>I</sub>	input capacitance		-	1.5	10	-	10	-	10	pF

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
<b>74AHCT1G125</b>										
$V_{IH}$	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	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	-	0.8	-	0.8	-	0.8	V
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$								
		$I_O = -50 \mu\text{A}$	4.4	4.5	-	4.4	-	4.4	-	V
		$I_O = -8.0 \text{ mA}$	3.94	-	-	3.8	-	3.70	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$								
		$I_O = 50 \mu\text{A}$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 8.0 \text{ mA}$	-	-	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	$\mu\text{A}$
$I_I$	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	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = V_{CC} \text{ or GND}; I_O = 0 \text{ A}; V_{CC} = 5.5 \text{ V}$	-	-	1.0	-	10	-	40	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	per input pin; $V_I = 3.4 \text{ V}$ ; other inputs at $V_{CC}$ or GND; $I_O = 0 \text{ A}; V_{CC} = 5.5 \text{ V}$	-	-	1.35	-	1.5	-	1.5	mA
$C_I$	input capacitance		-	1.5	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	Typ	Max	Min	Max	Min	Max	
<b>74AHC1G125</b>										
$t_{pd}$	propagation delay	A to Y; see <a href="#">Fig. 4</a> [1]								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}; C_L = 15 \text{ pF}$ [2]	-	4.7	8.0	1.0	9.5	1.0	11.5	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}; C_L = 50 \text{ pF}$ [2]	-	6.6	11.5	1.0	13.0	1.0	14.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$ [3]	-	3.4	5.5	1.0	6.5	1.0	7.0	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$ [3]	-	4.8	7.5	1.0	8.5	1.0	9.5	ns
$t_{en}$	enable time	$\overline{OE}$ to Y; see <a href="#">Fig. 5</a> [1]								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}; C_L = 15 \text{ pF}$ [2]	-	5.0	8.0	1.0	9.5	1.0	11.5	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}; C_L = 50 \text{ pF}$ [2]	-	6.9	11.5	1.0	13.0	1.0	14.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 15 \text{ pF}$ [3]	-	3.6	5.1	1.0	6.0	1.0	6.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; C_L = 50 \text{ pF}$ [3]	-	4.9	7.5	1.0	8.5	1.0	9.5	ns

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>dis</sub>	disable time	OE to Y; see Fig. 5 [1]								
		V <sub>CC</sub> = 3.0 V to 3.6 V; C <sub>L</sub> = 15 pF [2]	-	6.0	9.7	1.0	11.5	1.0	12.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V; C <sub>L</sub> = 50 pF [2]	-	8.3	13.2	1.0	15.0	1.0	16.5	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 15 pF [3]	-	4.1	6.8	1.0	8.0	1.0	8.5	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 50 pF [3]	-	5.7	8.8	1.0	10.0	1.0	11.0	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]	-	9	-	-	-	-	-	pF

74AHCT1G125										
t <sub>pd</sub>	propagation delay	A to Y; see Fig. 4 [1]								
		V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 15 pF [3]	-	3.4	5.5	1.0	6.5	1.0	7.0	ns
t <sub>en</sub>	enable time	OE to Y; see Fig. 5 [1]								
		V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 15 pF [3]	-	3.9	5.1	1.0	6.0	1.0	6.5	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 50 pF [3]	-	5.1	7.5	1.0	8.5	1.0	9.5	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; C <sub>L</sub> = 15 pF [3]	-	4.5	6.8	1.0	8.0	1.0	8.5	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V; C <sub>L</sub> = 50 pF [3]	-	6.1	8.8	1.0	10.0	1.0	11.0	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<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

t<sub>en</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>.

t<sub>dis</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>.

[2] Typical values are measured at V<sub>CC</sub> = 3.3 V.

[3] Typical values are measured at V<sub>CC</sub> = 5.0 V.

[4] C<sub>PD</sub> is used to determine the dynamic power dissipation P<sub>D</sub> (μW).

P<sub>D</sub> = C<sub>PD</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>i</sub> +  $\sum(C_L \times V_{CC}^2 \times f_o)$  where:

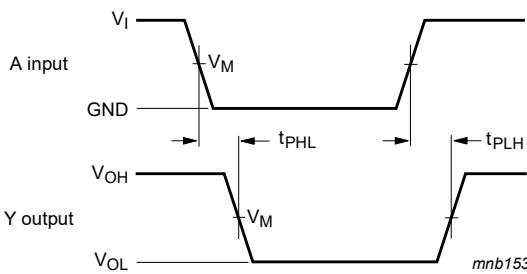
f<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

C<sub>L</sub> = output load capacitance in pF;

V<sub>CC</sub> = supply voltage in V.

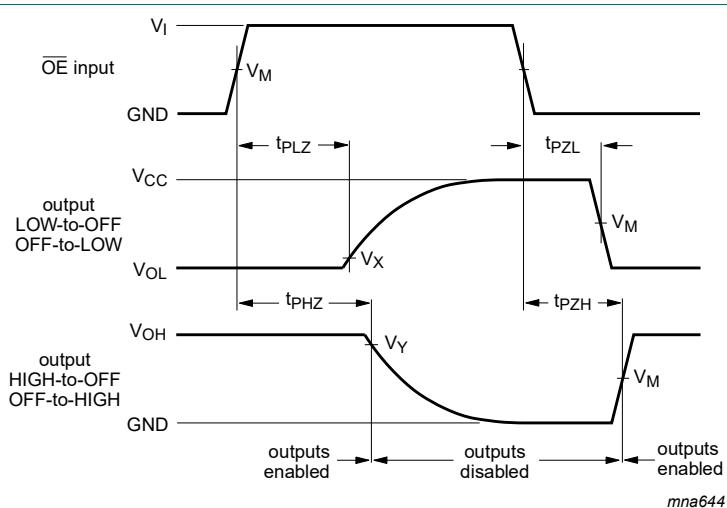
### 11.1. Waveforms and test circuit



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

$V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

**Fig. 4. Input (A) to output (Y) propagation delays**



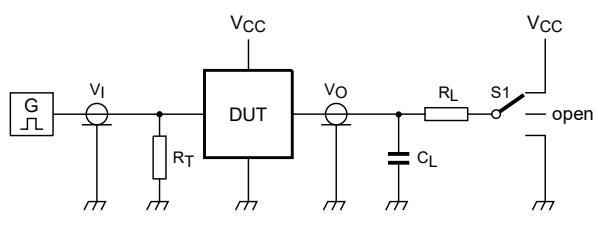
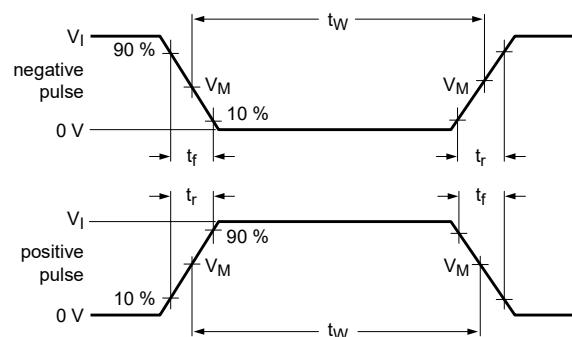
Measurement points are given in [Table 9](#).

$V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

**Fig. 5. Enable and disable times**

**Table 9. Measurement point**

Type	Inputs		Output		
	$V_I$	$V_M$	$V_M$	$V_X$	$V_Y$
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



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. 6. Test circuit for measuring switching times**

**Table 10. Test data**

Type	Input		Load		S1 position		
	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
74AHC1G125	$V_{CC}$	$\leq 3$ ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$
74AHCT1G125	3 V	$\leq 3$ ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$

## 12. Package outline

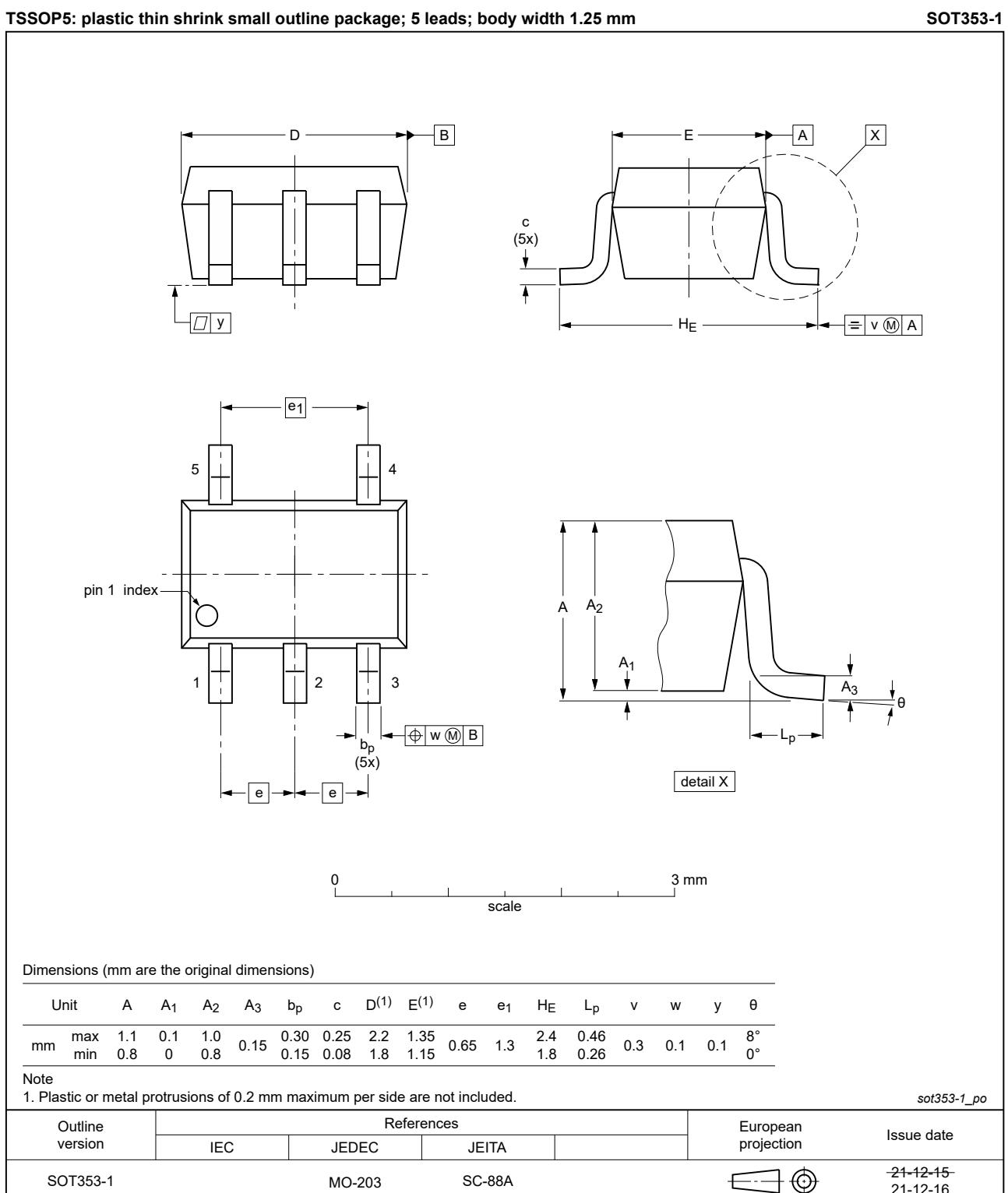


Fig. 7. Package outline SOT353-1 (TSSOP5)

## Plastic surface-mounted package; 5 leads

SOT753

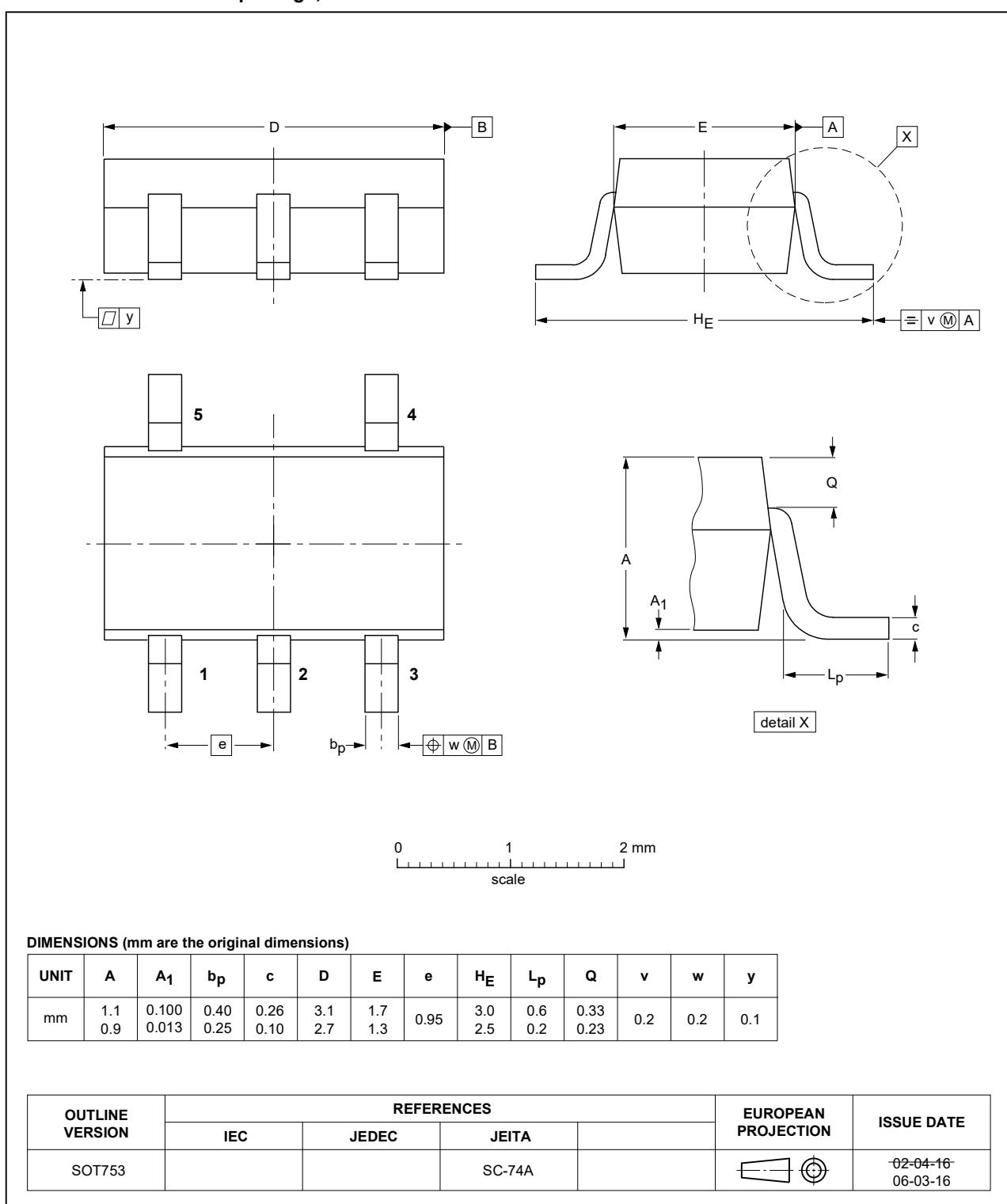


Fig. 8. Package outline SOT753 (SC-74A)

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

SOT886

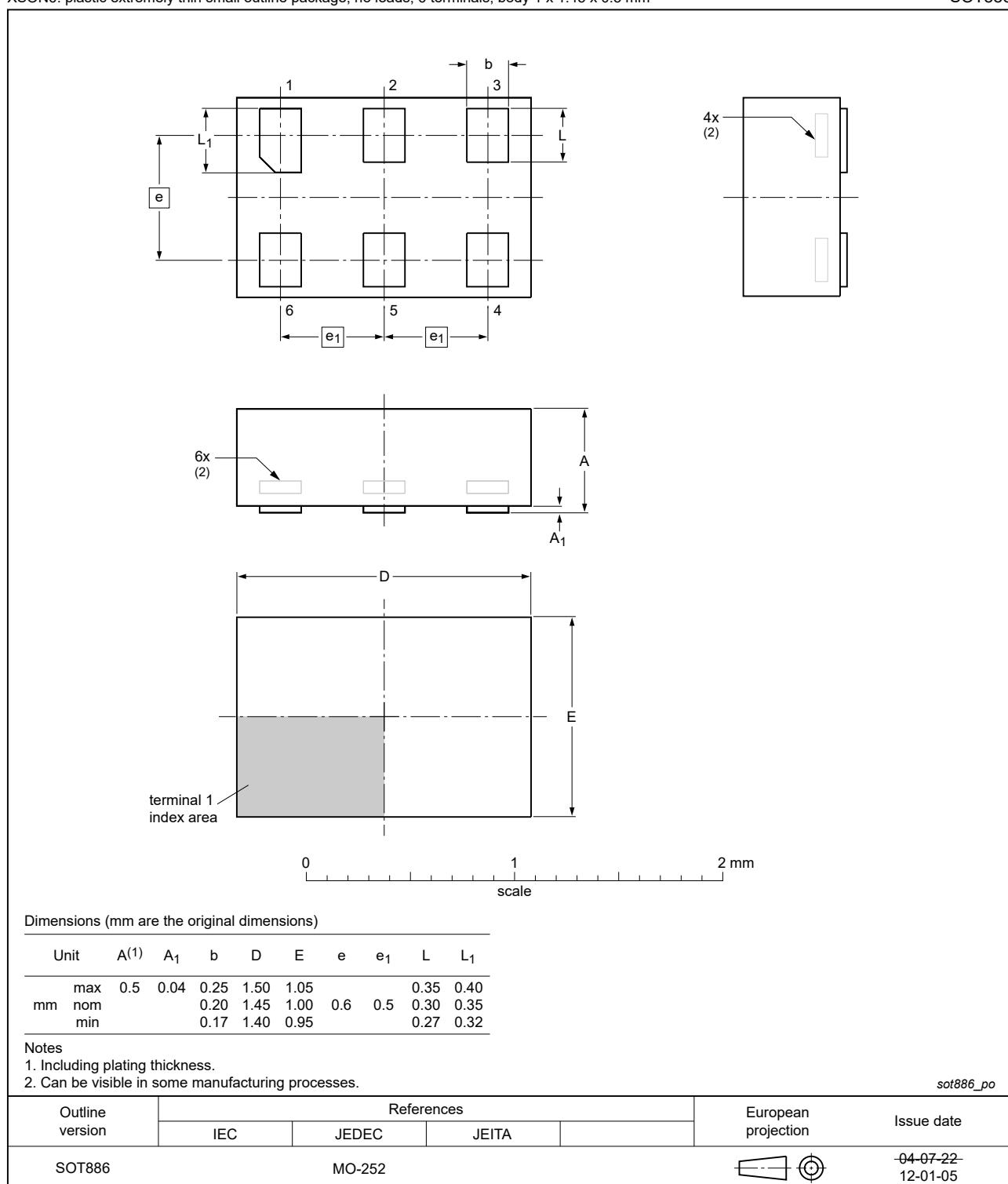


Fig. 9. Package outline SOT886 (XSON6)

**XSON5: Plastic thermal enhanced extremely thin small outline package with side-wettable flanks (SWF); no leads; 5 terminals; body  $1.1 \times 0.85 \times 0.5$  mm**

SOT8065-1

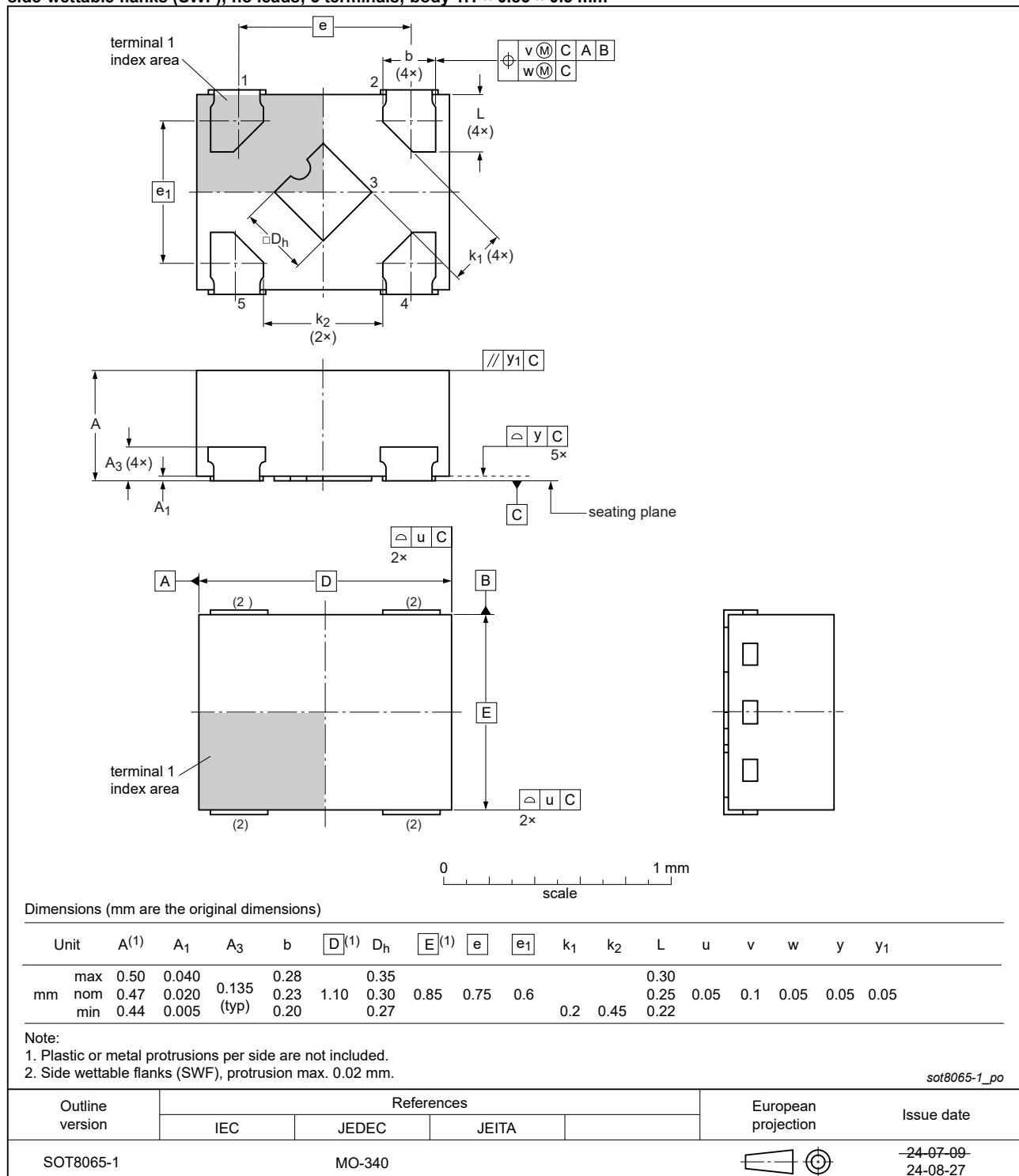


Fig. 10. Package outline SOT8065-1 (XSON5)

## 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
HBM	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_AHCT1G125 v.15.1	20240828	Product data sheet	-	74AHC_AHCT1G125 v.15
Modifications:				• <a href="#">Fig. 10</a> : Added JEDEC reference MO-340 to SOT8065-1 package outline drawing.
74AHC_AHCT1G125 v.15	20240715	Product data sheet	-	74AHC_AHCT1G125 v.14.2
Modifications:				• Type number 74AHC1G125GZ (SOT8065-1/XSON5) added.
74AHC_AHCT1G125 v.14.2	20231011	Product data sheet	-	74AHC_AHCT1G125 v.13
Modifications:				• <a href="#">Section 2</a> : ESD specifications updated.
74AHC_AHCT1G125 v.13	20220111	Product data sheet	-	74AHC_AHCT1G125 v.12
Modifications:				• <a href="#">Fig. 7</a> : Package outline drawing SOT353-1(TSSOP5) has changed
74AHC_AHCT1G125 v.12	20210526	Product data sheet	-	74AHC_AHCT1G125 v.11
Modifications:				• Type number 74AHCT1G125GF (SOT891 / XSON6) removed.
74AHC_AHCT1G125 v.11	20201013	Product data sheet	-	74AHC_AHCT1G125 v.10
Modifications:				• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate. • Type number 74AHC1G125GF (SOT891 / XSON6) removed. • <a href="#">Section 1</a> and <a href="#">Section 2</a> updated. • <a href="#">Table 5</a> : Derating values for $P_{tot}$ total power dissipation updated.
74AHC_AHCT1G125 v.10	20120823	Product data sheet	-	74AHC_AHCT1G125 v.9
Modifications:				• Package outline drawing of SOT886 ( <a href="#">Fig. 9</a> ) modified.
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

## 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.

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