

# 74ABT00

## Quad 2-input NAND gate

Rev. 4 — 5 October 2020

Product data sheet

### 1. General description

The 74ABT00 is a quad 2-input NAND gate. This device is fully specified for partial power down applications using  $I_{OFF}$ . The  $I_{OFF}$  circuitry disables the output, preventing the potentially damaging backflow current through the device when it is powered down.

### 2. Features and benefits

- Supply voltage range from 4.5 V to 5.5 V
- BiCMOS high speed and output drive
- Direct interface with TTL levels
- $I_{OFF}$  circuitry provides partial Power-down mode operation
- Latch-up protection exceeds 500 mA per JESD78B class II level A
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
- Specified from -40 °C to +85 °C

### 3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74ABT00D	-40 °C to +85 °C	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1
74ABT00PW	-40 °C to +85 °C	TSSOP14	plastic thin shrink small outline package; 14 leads; body width 4.4 mm	SOT402-1

### 4. Functional diagram

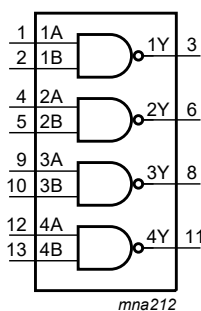


Fig. 1. Logic symbol

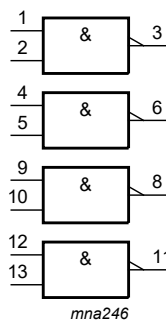


Fig. 2. IEC logic symbol

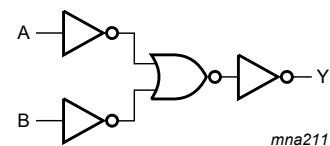


Fig. 3. Logic diagram (one gate)

## 5. Pinning information

### 5.1. Pinning

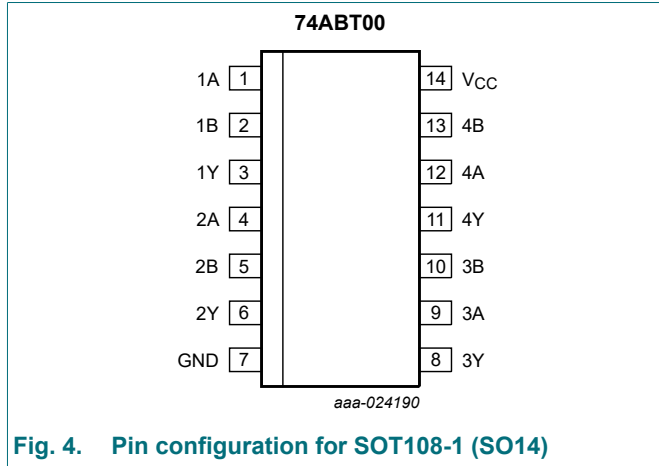


Fig. 4. Pin configuration for SOT108-1 (SO14)

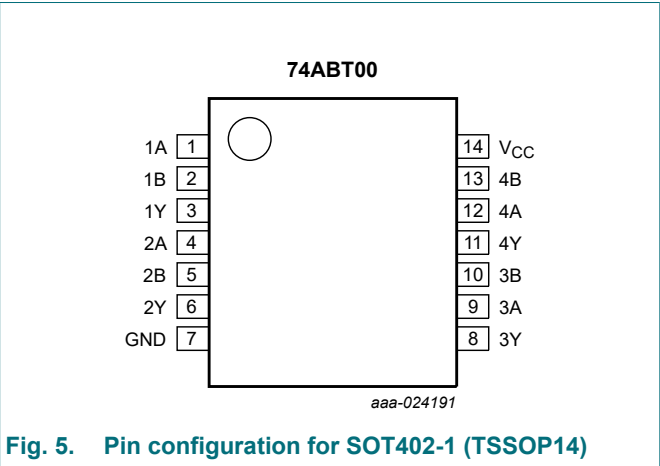


Fig. 5. Pin configuration for SOT402-1 (TSSOP14)

### 5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
1A, 2A, 3A, 4A	1, 4, 9, 12	data input
1B, 2B, 3B, 4B	2, 5, 10, 13	data input
1Y, 2Y, 3Y, 4Y	3, 6, 8, 11	data output
GND	7	ground (0 V)
V <sub>CC</sub>	14	supply voltage

## 6. Functional description

Table 3. Function table

*H = HIGH voltage level; L = LOW voltage level; X = don't care.*

Input		Output
nA	nB	nY
L	X	H
X	L	H
H	H	L

## 7. Limiting values

**Table 4. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		-0.5	+7.0	V
$V_I$	input voltage		[1] -1.2	+7.0	V
$V_O$	output voltage	output HIGH or LOW	[1] -0.5	+5.5	V
$I_{IK}$	input clamping current	$V_I < 0$ V	-18	-	mA
$I_{OK}$	output clamping current	$V_O < 0$ V	-50	-	mA
$I_O$	output current	output in LOW-state	-	40	mA
$T_j$	junction temperature		-	150	°C
$T_{stg}$	storage temperature		-65	+150	°C

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

## 8. Recommended operating conditions

**Table 5. Operating conditions**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CC}$	supply voltage		4.5	-	5.5	V
$V_I$	input voltage		0	-	$V_{CC}$	V
$V_{IH}$	HIGH-level input voltage		2.0	-	-	V
$V_{IL}$	LOW-level input voltage		-	-	0.8	V
$I_{OH}$	HIGH-level output current		-15	-	-	mA
$I_{OL}$	LOW-level output current		-	-	20	mA
$\Delta t/\Delta V$	input transition rise and fall rate		0	-	5	ns/V
$T_{amb}$	ambient temperature	in free air	-40	-	+85	°C

## 9. Static characteristics

Table 6. Static characteristics

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		Unit
			Min	Typ	Max	Min	Max	
$V_{IK}$	input clamping voltage	$V_{CC} = 4.5 \text{ V}$ ; $I_{IK} = -18 \text{ mA}$	-1.2	-0.9	-	-1.2	-	V
$V_{OH}$	HIGH-level output voltage	$V_{CC} = 4.5 \text{ V}$ ; $I_{OH} = -15 \text{ mA}$ ; $V_I = V_{IL}$ or $V_{IH}$	2.5	2.9	-	2.5	-	V
$V_{OL}$	LOW-level output voltage	$V_{CC} = 4.5 \text{ V}$ ; $I_{OL} = 20 \text{ mA}$ ; $V_I = V_{IL}$ or $V_{IH}$	-	0.35	0.5	-	0.5	V
$I_I$	input leakage current	$V_{CC} = 5.5 \text{ V}$ ; $V_I = \text{GND}$ or $5.5 \text{ V}$	-	$\pm 0.01$	$\pm 1.0$	-	$\pm 1.0$	$\mu\text{A}$
$I_{OFF}$	power-off leakage current	$V_{CC} = 0 \text{ V}$ ; $V_I$ or $V_O \leq 4.5 \text{ V}$	-	$\pm 5.0$	$\pm 100$	-	$\pm 100$	$\mu\text{A}$
$I_{CEX}$	output high leakage current	HIGH-state; $V_O = 5.5 \text{ V}$ ; $V_{CC} = 5.5 \text{ V}$ ; $V_I = \text{GND}$ or $V_{CC}$	-	5.0	50	-	50	$\mu\text{A}$
$I_O$	output current	$V_{CC} = 5.5 \text{ V}$ ; $V_O = 2.5 \text{ V}$ [1]	-50	-75	-180	-50	-180	mA
$I_{CC}$	supply current	$V_{CC} = 5.5 \text{ V}$ ; $V_I = \text{GND}$ or $V_{CC}$	-	2	50	-	50	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	per input pin; $V_{CC} = 5.5 \text{ V}$ ; one input at $3.4 \text{ V}$ ; other inputs at $V_{CC}$ or $\text{GND}$ [2]	-	0.25	500	-	500	$\mu\text{A}$
$C_I$	input capacitance	$V_I = 0 \text{ V}$ or $V_{CC}$	-	3	-	-	-	pF

[1] Not more than one output should be tested at a time, and the duration of the test should not exceed one second.

[2] This is the increase in supply current for each input at  $3.4 \text{ V}$ .

## 10. Dynamic characteristics

Table 7. Dynamic characteristics

$\text{GND} = 0 \text{ V}$ ; for test circuit, see Fig. 7.

Symbol	Parameter	Conditions	25 °C; $V_{CC} = 5.0 \text{ V}$			-40 °C to +85 °C; $V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$		Unit
			Min	Typ	Max	Min	Max	
$t_{PLH}$	LOW to HIGH propagation delay	nA, nB to nY; see Fig. 6	1.0	2.5	3.6	1.0	4.1	ns
$t_{PHL}$	HIGH to LOW propagation delay	nA, nB to nY; see Fig. 6	1.0	2.0	2.8	1.0	3.4	ns
$t_{sk(o)}$	output skew time	[1]	-	0.4	0.5	-	0.5	ns

[1] Skew between any two outputs of the same package switching in the same direction. This parameter is guaranteed by design.

10.1. Waveforms and test circuit

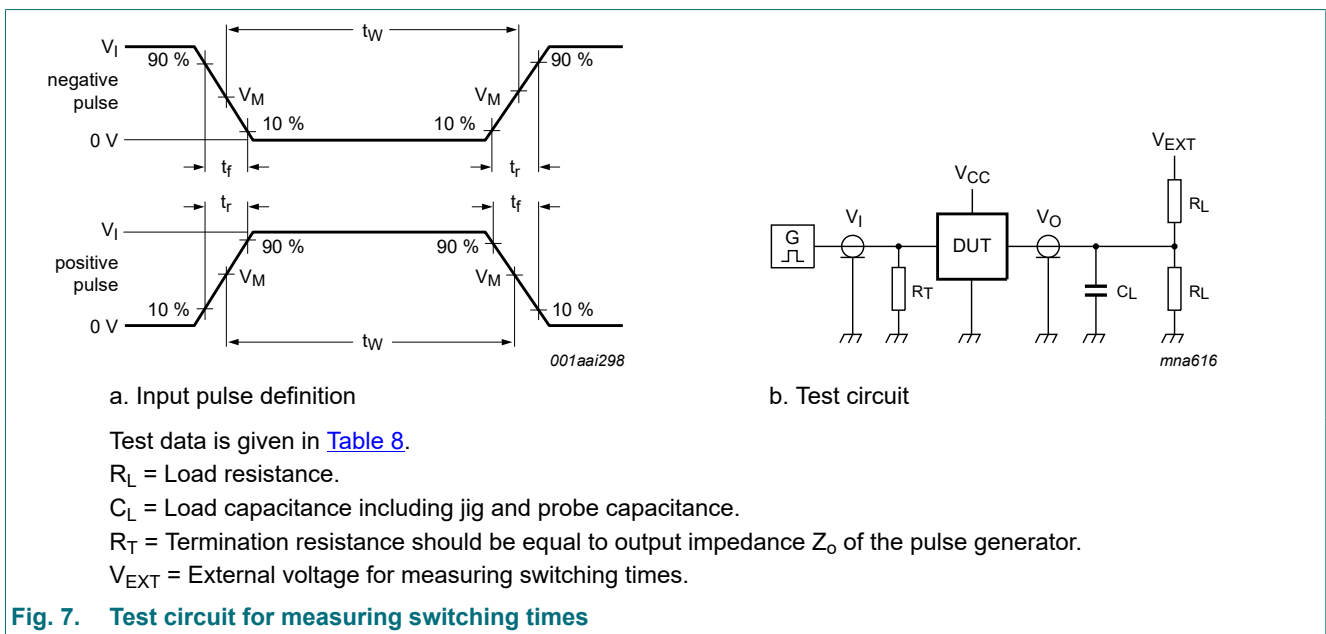
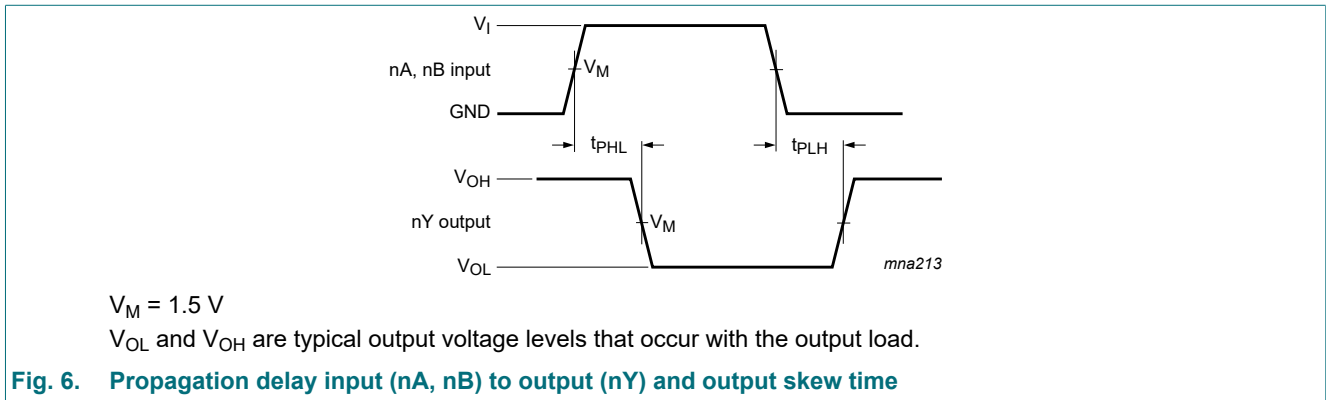


Table 8. Test data

Input				Load		$V_{EXT}$
$V_I$	$f_i$	$t_w$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$
3.0 V	1 MHz	500 ns	$\leq 2.5\text{ ns}$	50 pF	500 $\Omega$	open

### 11. Package outline

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

SOT108-1

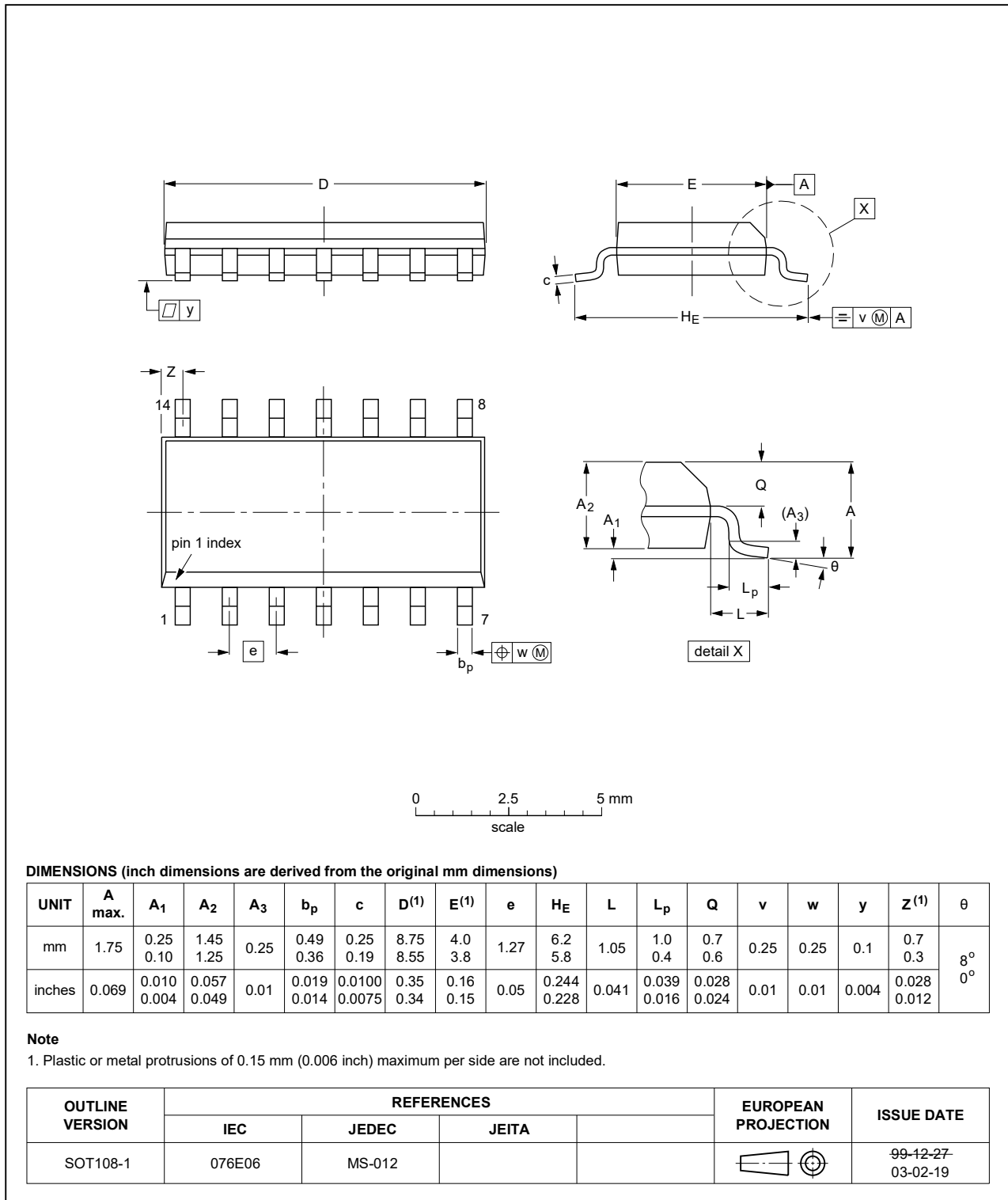


Fig. 8. Package outline SOT108-1 (SO14)

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

SOT402-1

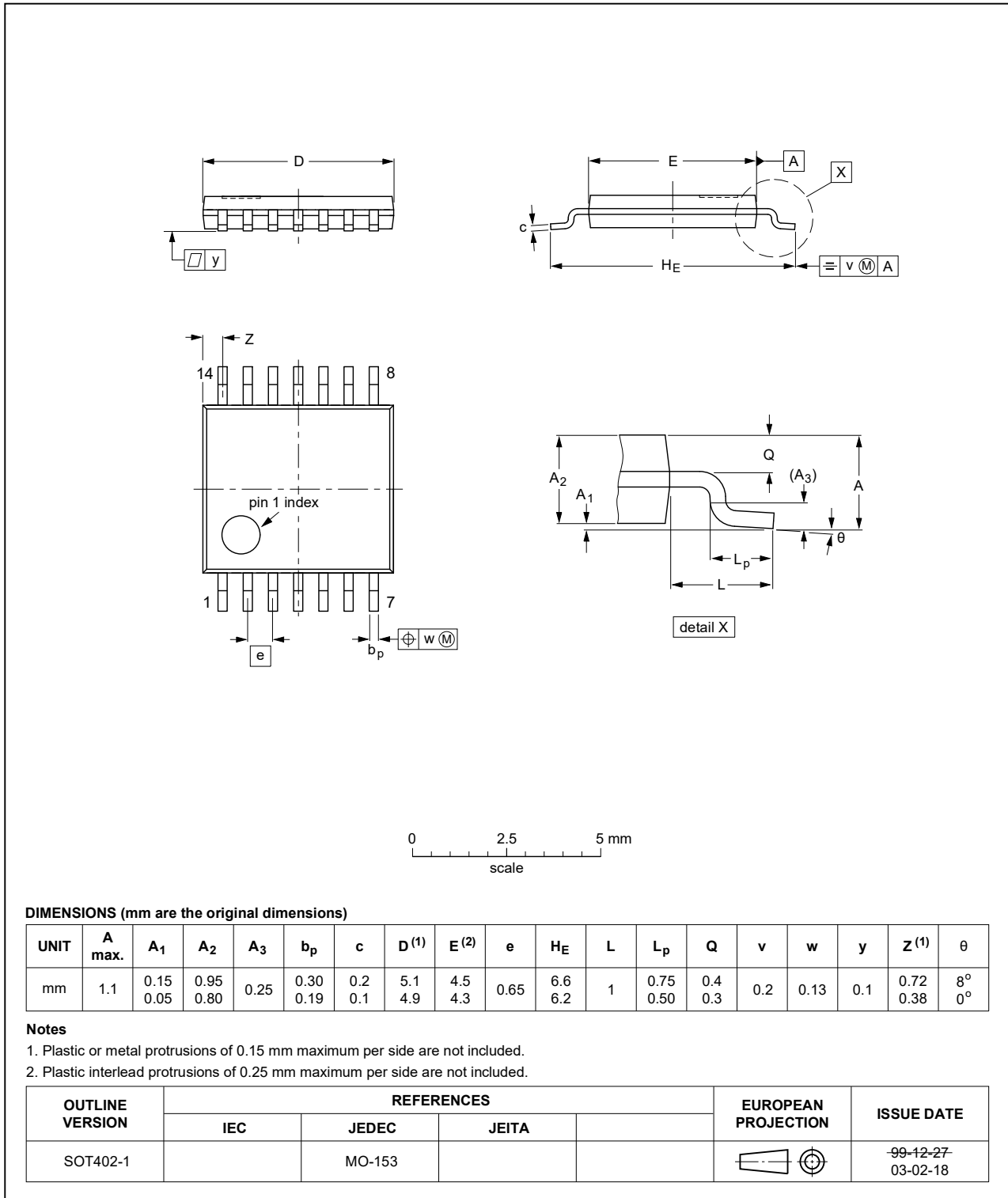


Fig. 9. Package outline SOT402-1 (TSSOP14)

## 12. Abbreviations

Table 9. Abbreviations

Acronym	Description
BiCMOS	Bipolar Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
TTL	Transistor-Transistor Logic

## 13. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74ABT00 v.4	20201005	Product data sheet	-	74ABT00 v.3
Modifications:	<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li><a href="#">Section 1</a> and <a href="#">Section 2</a> updated.</li> <li>Type number 74ABT00DB (SOT337-1 / SSOP14) removed.</li> </ul>			
74ABT00 v.3	20160811	Product data sheet	-	74ABT00 v.2
Modifications:	<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> </ul>			
74ABT00 v.2	19950918	Product specification	-	-



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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".
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