

74ABT04

Hex inverter

Rev. 5.1 — 18 January 2024

Product data sheet

1. General description

The 74ABT04 is a hex inverter. 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

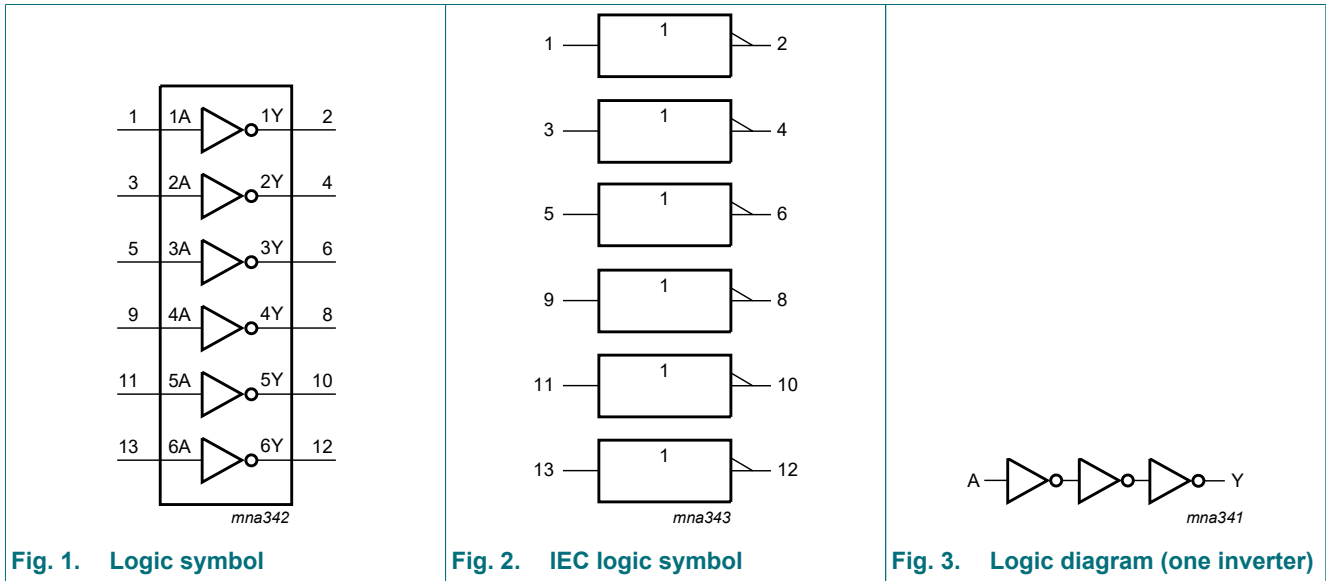
- Supply voltage range from 4.5 V to 5.5 V
- BiCMOS high speed and output drive
- Direct interface with TTL levels
- I_{OFF} circuitry provides partial Power-down mode operation
- Latch-up protection exceeds 500 mA per JEDEC class II level A
- ESD protection:
 - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
 - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Specified from -40 °C to +85 °C

3. Ordering information

Table 1. Ordering information

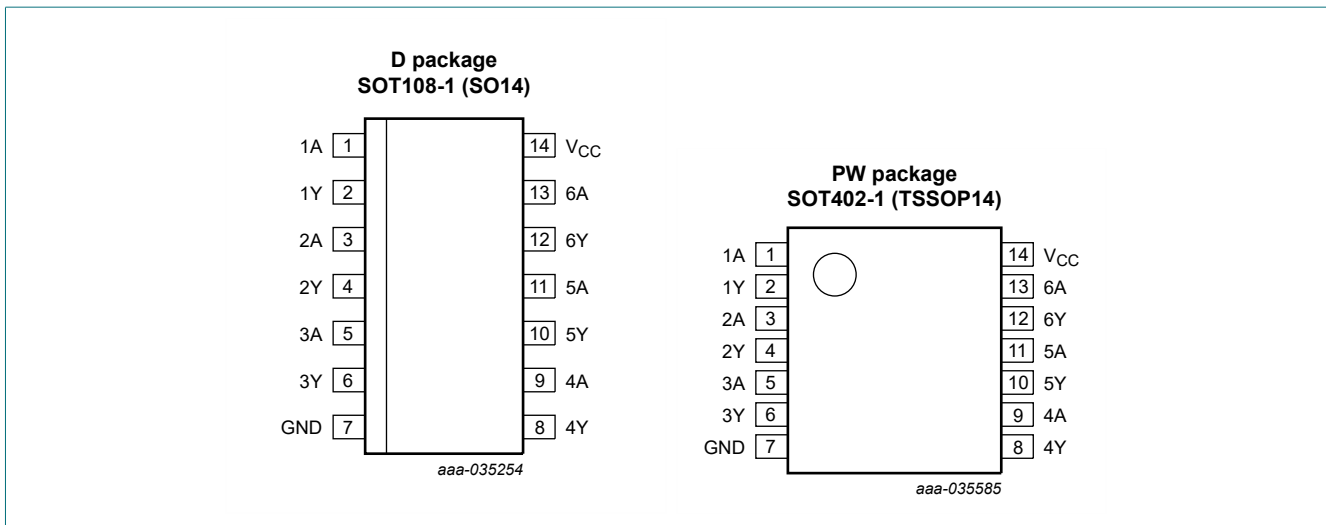
Type number	Package			
	Temperature range	Name	Description	Version
74ABT04D	-40 °C to +85 °C	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1
74ABT04PW	-40 °C to +85 °C	TSSOP14	plastic thin shrink small outline package; 14 leads; body width 4.4 mm	SOT402-1

4. Functional diagram



5. Pinning information

5.1. Pinning



5.2. Pin description

Table 2. Pin description

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

6. Functional description

Table 3. Function table

H = HIGH voltage level; L = LOW voltage level

Input	Output
nA	nY
L	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 V	-	± 0.01	± 1.0	-	± 1.0	μA
I_{OFF}	power-off leakage current	$V_{CC} = 0 \text{ V}$; V_I or $V_O \leq 4.5 \text{ V}$	-	± 5.0	± 100	-	± 100	μA
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	μA
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	μA
ΔI_{CC}	additional supply current	per input pin; $V_{CC} = 5.5 \text{ V}$; one input at 3.4 V ; other inputs at V_{CC} or GND [2]	-	0.25	500	-	500	μA
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 V .

10. Dynamic characteristics

Table 7. Dynamic characteristics

$GND = 0 \text{ V}$; for test circuit, see Fig. 5.

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 to nY; see Fig. 4	1.0	2.2	3.4	1.0	4.1	ns
t_{PHL}	HIGH to LOW propagation delay	nA to nY; see Fig. 4	1.0	1.6	2.5	1.0	3.0	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

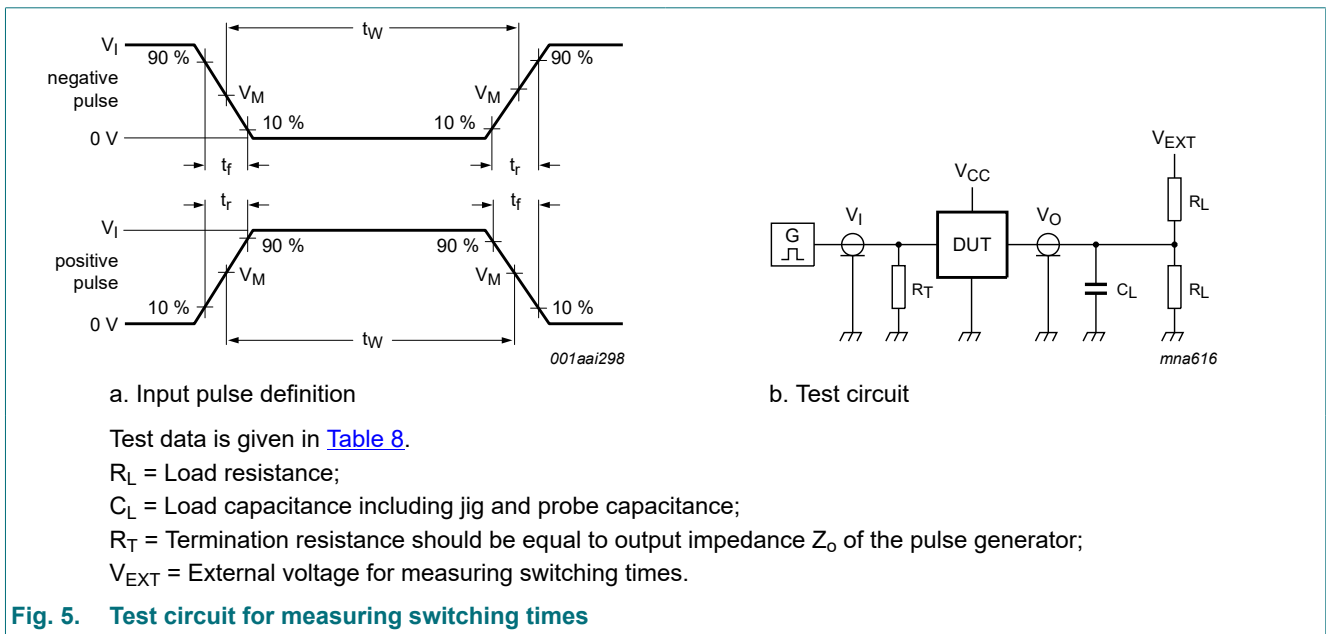
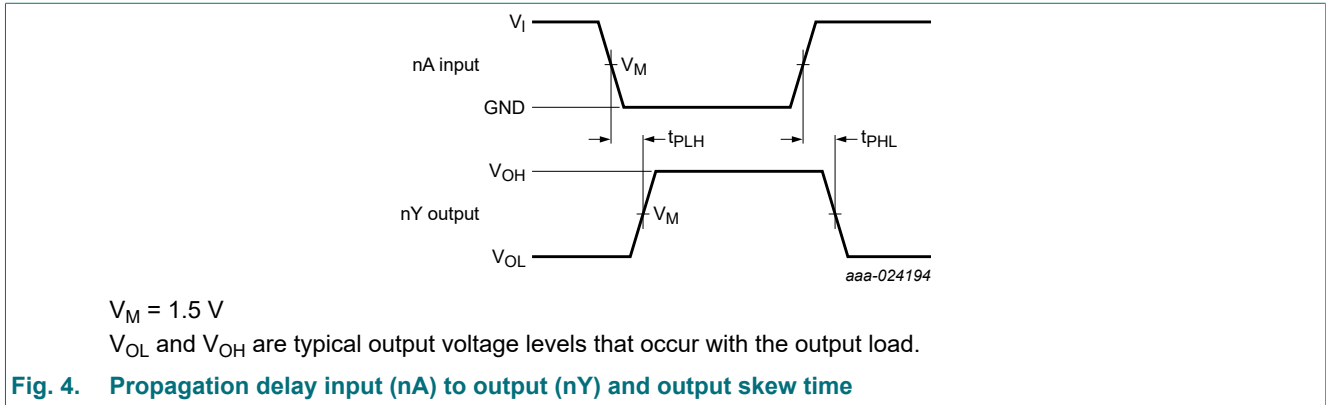


Table 8. Test data

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 Ω	open

11. Package outline

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

SOT108-1

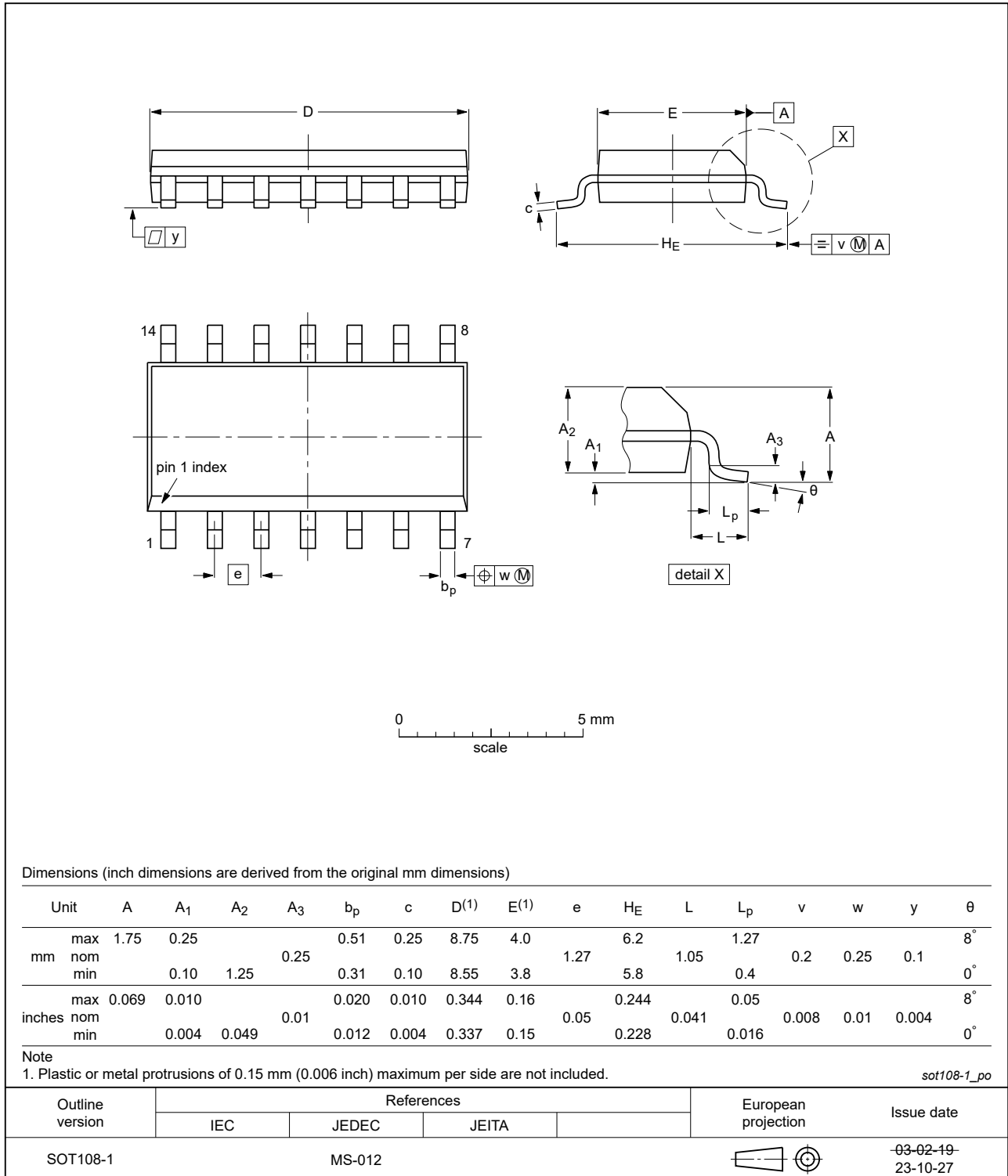


Fig. 6. Package outline SOT108-1 (SO14)

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

SOT402-1

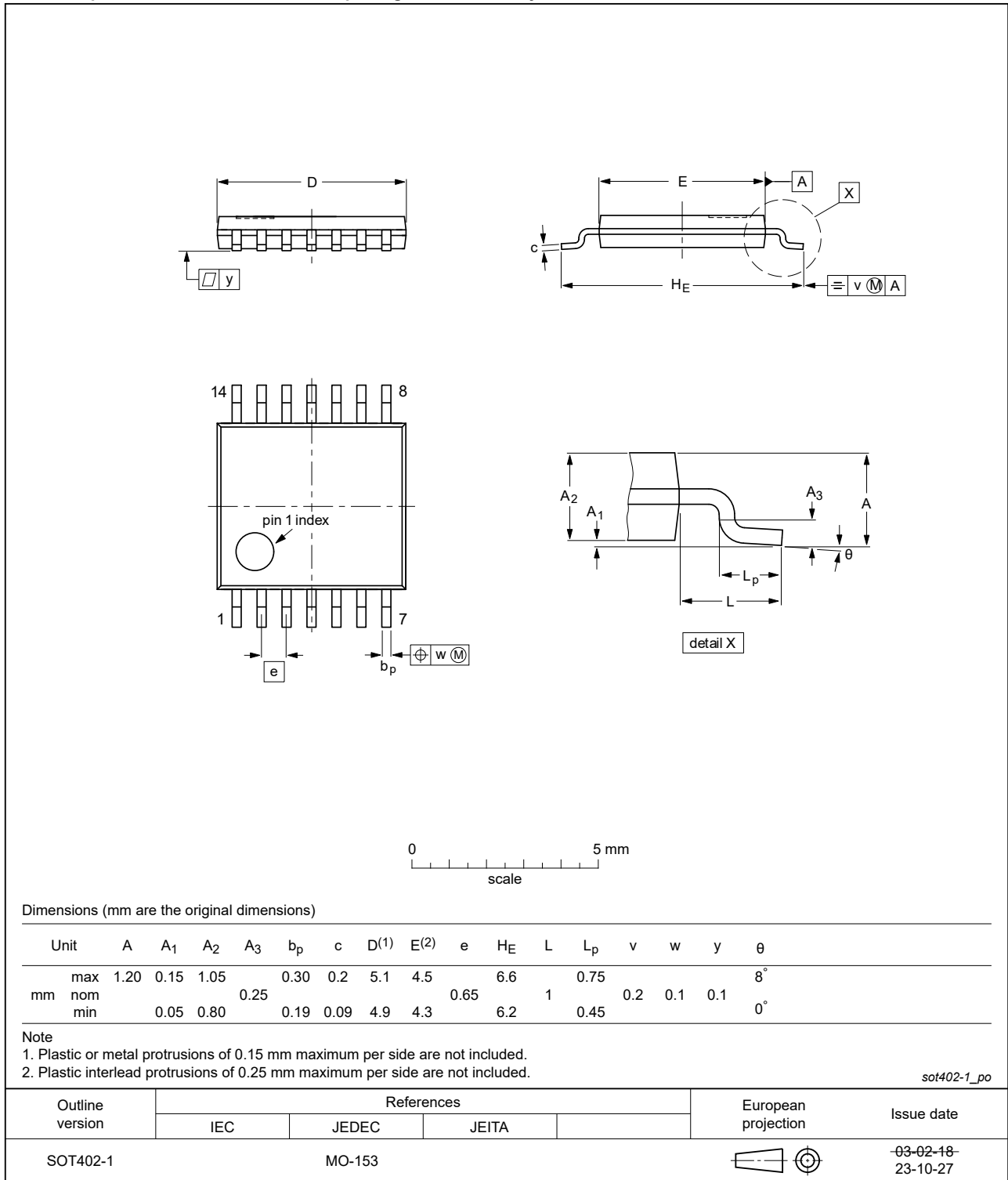


Fig. 7. Package outline SOT402-1 (TSSOP14)

12. Abbreviations

Table 9. Abbreviations

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

13. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74ABT04 v.5.1	20240118	Product data sheet	-	74ABT04 v.4
Modifications:	<ul style="list-style-type: none"> • Section 2: ESD specification updated according to the latest JEDEC standard. • Fig. 6, Fig. 7: Aligned SO and TSSOP package outline drawings to JEDEC MS-012 and MO-153. 			
74ABT04 v.4	20201006	Product data sheet	-	74ABT04 v.3
Modifications:	<ul style="list-style-type: none"> • 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. • Section 1 and Section 2 updated. • Type number 74ABT04DB (SOT337-1 / SSOP14) removed. 			
74ABT04 v.3	20160812	Product data sheet	-	74ABT04 v.2
Modifications:	<ul style="list-style-type: none"> • The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. 			
74ABT04 v.2	19950918	Product specification	-	-

14. 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.

- [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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