

# 74LVT08

## 3.3 V Quad 2-input AND gate

Rev. 4 — 27 July 2021

Product data sheet

### 1. General description

The 74LVT08 is a quad 2-input AND 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

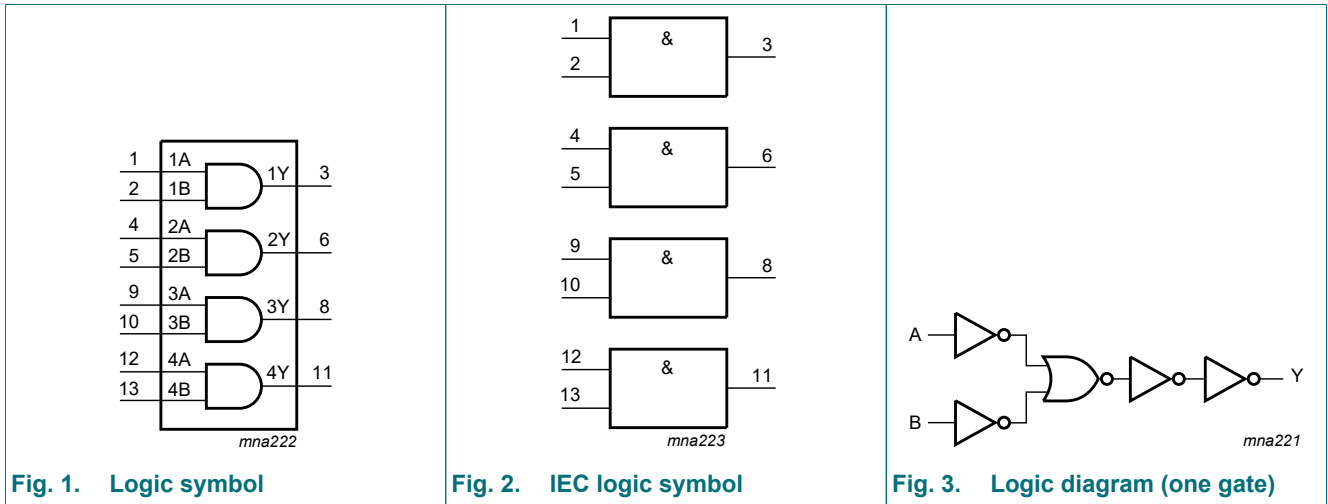
- Wide supply voltage range from 2.7 V to 3.6 V
- Overvoltage tolerant inputs to 5.5 V
- BiCMOS high speed and output drive
- Output capability: +64 mA and -32 mA
- Direct interface with TTL levels
- No bus current loading when output is tied to 5 V bus
- Power-up 3-state
- $I_{OFF}$  circuitry provides partial Power-down mode operation
- Latch-up performance exceeds 500 mA per JESD 78 Class II Level B
- Complies with JEDEC standard: JESD8C (2.7 V to 3.6 V)
- ESD protection:
  - HBM JESD22-A114E exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
- Specified from -40 °C to 85 °C

### 3. Ordering information

Table 1. Ordering information

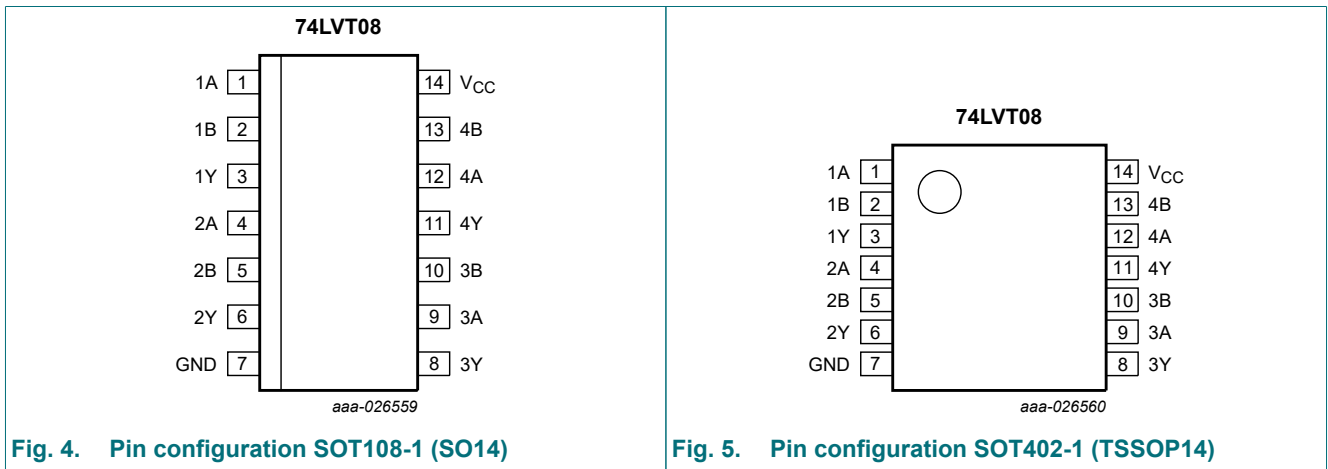
Type number	Package			
	Temperature range	Name	Description	Version
74LVT08D	-40 °C to +85 °C	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1
74LVT08PW	-40 °C to +85 °C	TSSOP14	plastic thin shrink small outline package; 14 leads; body width 4.4 mm	SOT402-1

## 4. Functional diagram



## 5. Pinning information

### 5.1. Pinning



### 5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
1Y, 2Y, 3Y, 4Y	3, 6, 8, 11	data output
1A, 2A, 3A, 4A	1, 4, 9, 12	data input
1B, 2B, 3B, 4B	2, 5, 10, 13	data input
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*

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

## 7. Limiting values

**Table 4. 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	+4.6	V
$V_I$	input voltage		[1] -0.5	+7.0	V
$V_O$	output voltage	output in OFF-state or HIGH-state	[1] -0.5	+7.0	V
$I_{IK}$	input clamping current	$V_I < 0$ V	-50	-	mA
$I_{OK}$	output clamping current	$V_O < 0$ V	-50	-	mA
$I_O$	output current	output in LOW-state	-	64	mA
		output in HIGH-state	-32	-	mA
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		[2] -	150	°C
$P_{tot}$	total power dissipation	$T_{amb} = -40$ to $+85$ °C	[3] -	500	mW

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

[2] The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability.

[3] For SOT402-1 (TSSOP14) package:  $P_{tot}$  derates linearly with 7.3 mW/K above 81 °C.

## 8. Recommended operating conditions

**Table 5. Operating conditions**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CC}$	supply voltage		2.7	-	3.6	V
$V_I$	input voltage		0	-	5.5	V
$I_{OH}$	HIGH-level output current		-20	-	-	mA
$I_{OL}$	LOW-level output current		-	-	32	mA
$T_{amb}$	ambient temperature	in free-air	-40	-	+85	°C
$\Delta t/\Delta V$	input transition rise and fall rate	outputs enabled	-	-	10	ns/V

## 9. Static characteristics

**Table 6. Static characteristics**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	T <sub>amb</sub> = -40 °C to +85 °C			Unit
			Min	Typ[1]	Max	
V <sub>IK</sub>	input clamping voltage	V <sub>CC</sub> = 2.7 V; I <sub>IK</sub> = -18 mA	-1.2	-	-	V
V <sub>IH</sub>	HIGH-level input voltage		2.0	-	-	V
V <sub>IL</sub>	LOW-level input voltage		-	-	0.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>CC</sub> = 2.7 V to 3.6 V; I <sub>OH</sub> = -100 μA	V <sub>CC</sub> - 0.2	-	-	V
		V <sub>CC</sub> = 2.7 V; I <sub>OH</sub> = -6 mA	2.4	-	-	V
		V <sub>CC</sub> = 3.0 V; I <sub>OH</sub> = -20 mA	2.0	-	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>CC</sub> = 2.7 V; I <sub>OL</sub> = 100 μA	-	-	0.2	V
		V <sub>CC</sub> = 2.7 V; I <sub>OL</sub> = 24 mA	-	-	0.5	V
		V <sub>CC</sub> = 3.0 V; I <sub>OL</sub> = 32 mA	-	-	0.5	V
I <sub>I</sub>	input leakage current	V <sub>CC</sub> = 0 V or 3.6 V; V <sub>I</sub> = 5.5 V	-	-	10	μA
		V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>CC</sub> or GND	-	-	±1	μA
I <sub>OFF</sub>	power-off leakage current	V <sub>CC</sub> = 0 V; V <sub>I</sub> or V <sub>O</sub> = 0 V to 4.5 V	-	-	±100	μA
I <sub>CC</sub>	supply current	V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A				
		output HIGH	-	-	0.02	mA
		output LOW	-	1	2	mA
ΔI <sub>CC</sub>	additional supply current	per input pin; V <sub>CC</sub> = 3.0 V to 3.6 V; one input at V <sub>CC</sub> - 0.6 V and other inputs at V <sub>CC</sub> or GND [2]	-	-	0.2	mA
C <sub>I</sub>	input capacitance	V <sub>I</sub> = 0 V or 3.0 V	-	4	-	pF
C <sub>O</sub>	output capacitance	V <sub>O</sub> = 0 V or 3.0 V	-	10	-	pF

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and V<sub>CC</sub> = 3.3 V.

[2] This is the increase in supply current for each input at the specified voltage level other than V<sub>CC</sub> or GND.

## 10. Dynamic characteristics

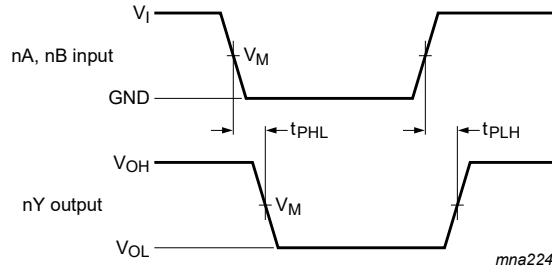
**Table 7. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 7.

Symbol	Parameter	Conditions	T <sub>amb</sub> = -40 °C to +85 °C			Unit
			Min	Typ[1]	Max	
t <sub>PLH</sub>	LOW to HIGH propagation delay	nA or nB to nY; see Fig. 6				
		V <sub>CC</sub> = 2.7 V	-	-	4.7	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1	3.0	3.9	ns
t <sub>PHL</sub>	HIGH to LOW propagation delay	nA or nB to nY; see Fig. 6				
		V <sub>CC</sub> = 2.7 V	-	-	4.8	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1	3.4	4.6	ns

[1] Typical values are measured at V<sub>CC</sub> = 3.3 V and T<sub>amb</sub> = 25 °C.

10.1. Waveforms and test circuit



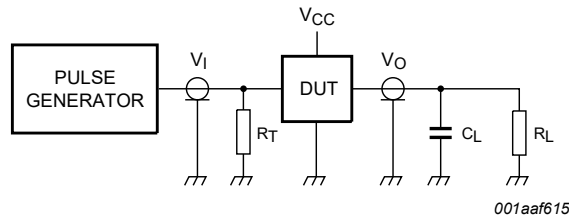
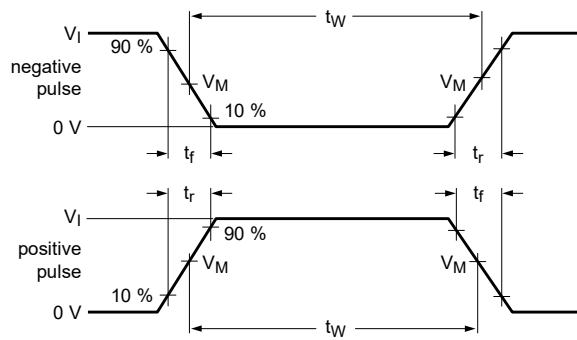
Measurement points are given in [Table 8](#).

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

Fig. 6. Propagation delay input (nA, nB) to output (nY)

Table 8. Measurement points

Input		Output
$V_M$	$V_I$	$V_M$
1.5 V	2.7 V	1.5 V



Test data is given in [Table 9](#).

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.

Fig. 7. Test circuit for measuring switching times

Table 9. Test data

Input				Load		Test
$V_I$	$f_i$	$t_W$	$t_r, t_f$	$C_L$	$R_L$	
2.7 V	$\leq 10$ MHz	500 ns	$\leq 2.5$ ns	50 pF	500 $\Omega$	$t_{PLH}, t_{PHL}$

### 11. Package outline

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

SOT108-1

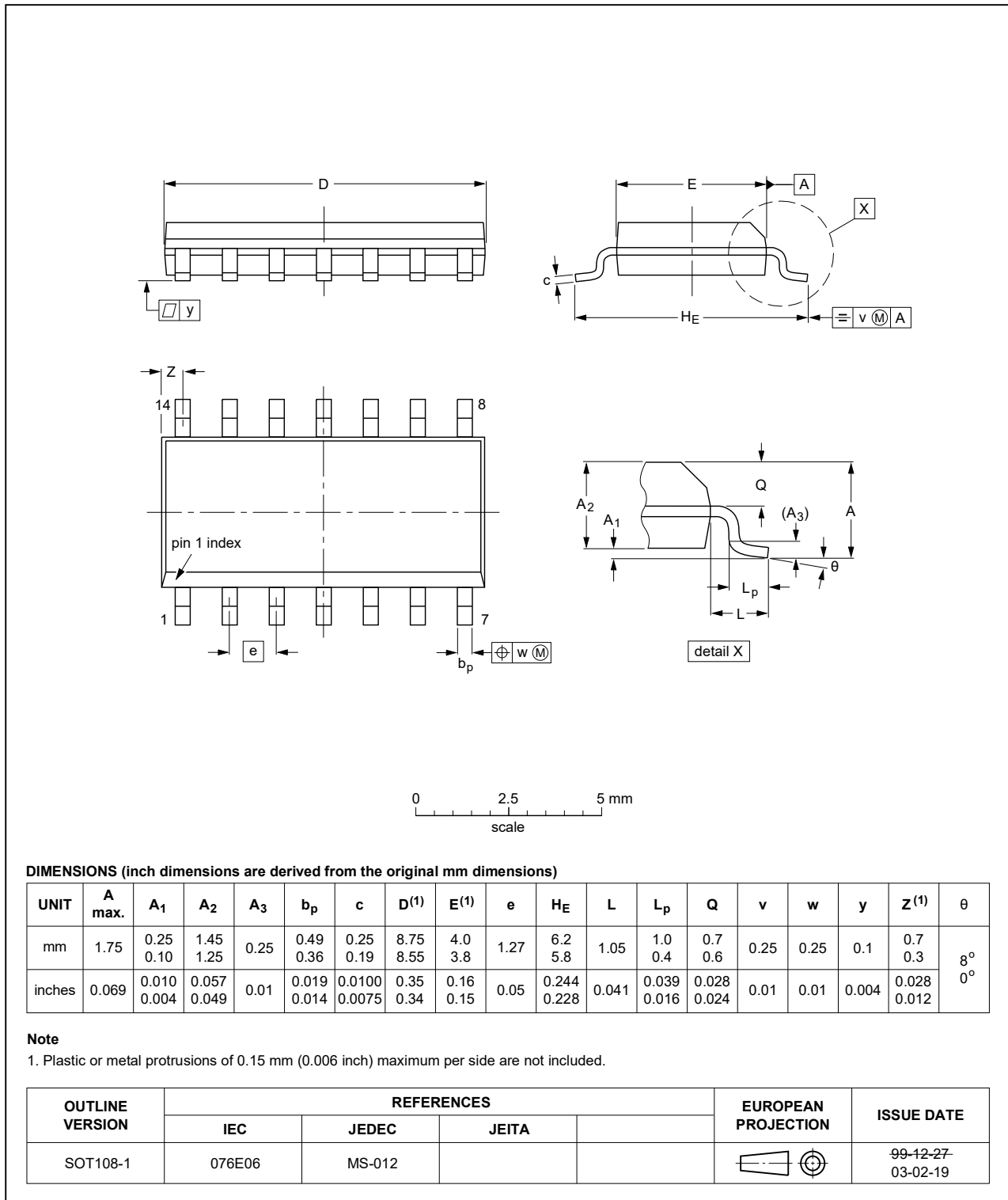


Fig. 8. Package outline SOT108-1 (SO14)

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

SOT402-1

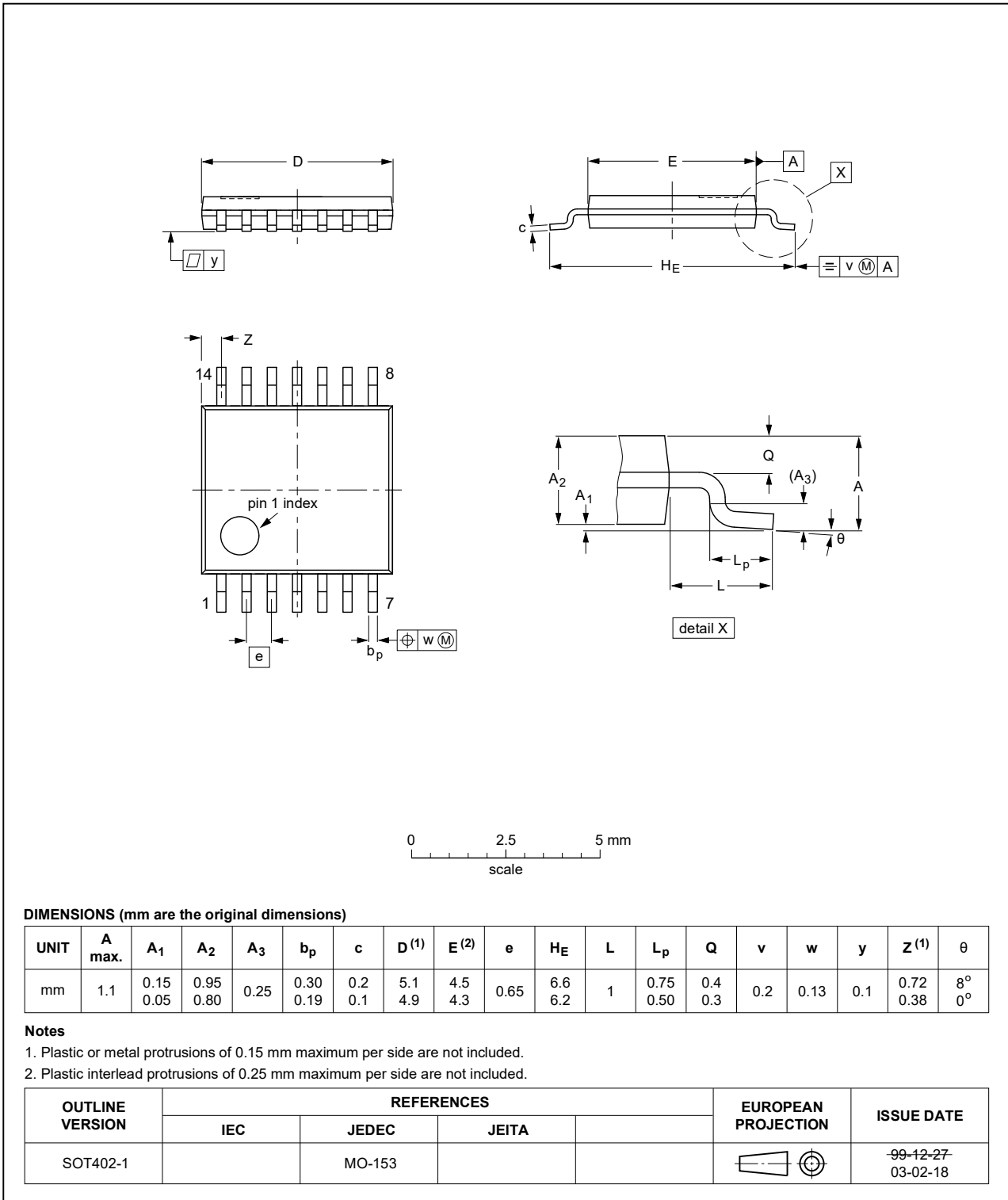


Fig. 9. Package outline SOT402-1 (TSSOP14)

## 12. Abbreviations

Table 10. 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 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVT08 v.4	20210727	Product data sheet	-	74LVT08 v.3
Modifications:	<ul style="list-style-type: none"> <li>Type number 74LVT08DB (SOT337-1/SSOP14) removed.</li> <li><a href="#">Section 1</a> and <a href="#">Section 2</a> updated.</li> <li><a href="#">Section 7</a>: Derating values for <math>P_{tot}</math> total power dissipation updated.</li> <li><a href="#">Section 9</a>: Changed <math>\Delta I_{CC}</math> value from 0.2 <math>\mu</math>A to 0.2 mA (errata).</li> </ul>			
74LVT08 v.3	20170322	Product data sheet	-	74LVT08 v.2
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> </ul>			
74LVT08 v.2	19960529	Product specification	-	74LVT08 v.1



## 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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## Contents

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<b>1. General description</b> .....	<b>1</b>
<b>2. Features and benefits</b> .....	<b>1</b>
<b>3. Ordering information</b> .....	<b>1</b>
<b>4. Functional diagram</b> .....	<b>2</b>
<b>5. Pinning information</b> .....	<b>2</b>
5.1. Pinning.....	2
5.2. Pin description.....	2
<b>6. Functional description</b> .....	<b>3</b>
<b>7. Limiting values</b> .....	<b>3</b>
<b>8. Recommended operating conditions</b> .....	<b>3</b>
<b>9. Static characteristics</b> .....	<b>4</b>
<b>10. Dynamic characteristics</b> .....	<b>4</b>
10.1. Waveforms and test circuit.....	5
<b>11. Package outline</b> .....	<b>6</b>
<b>12. Abbreviations</b> .....	<b>8</b>
<b>13. Revision history</b> .....	<b>8</b>
<b>14. Legal information</b> .....	<b>9</b>

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Date of release: 27 July 2021

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