

# 74LV244A

Octal buffer/line driver; 3-state

Rev. 2 — 4 July 2024

Product data sheet

## 1. General description

The 74LV244A is an 8-bit buffer/line driver with 3-state outputs. The device features two output enables (1 $\overline{OE}$  and 2 $\overline{OE}$ ). A HIGH on n $\overline{OE}$  causes the associated outputs to assume a high-impedance OFF-state.

Inputs are overvoltage tolerant. This feature allows the use of these devices as translators in mixed voltage environments.

Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times.

This device is fully specified for partial power down applications using I<sub>OFF</sub>. The I<sub>OFF</sub> 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 2.0 V to 5.5 V
- Maximum t<sub>pd</sub> of 6.5 ns at 5 V
- Typical V<sub>OL(p)</sub> < 0.8 V at V<sub>CC</sub> = 3.3 V, T<sub>amb</sub> = 25 °C
- Typical V<sub>OH(v)</sub> > 2.3 V at V<sub>CC</sub> = 3.3 V, T<sub>amb</sub> = 25 °C
- Supports mixed-mode voltage operation on all ports
- I<sub>OFF</sub> circuitry provides partial Power-down mode operation
- Latch-up performance exceeds 250 mA per JESD 78 Class II
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 3000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 2000 V
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C

## 3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
<a href="#">74LV244APW</a>	-40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	<a href="#">SOT360-1</a>

### 4. Functional diagram

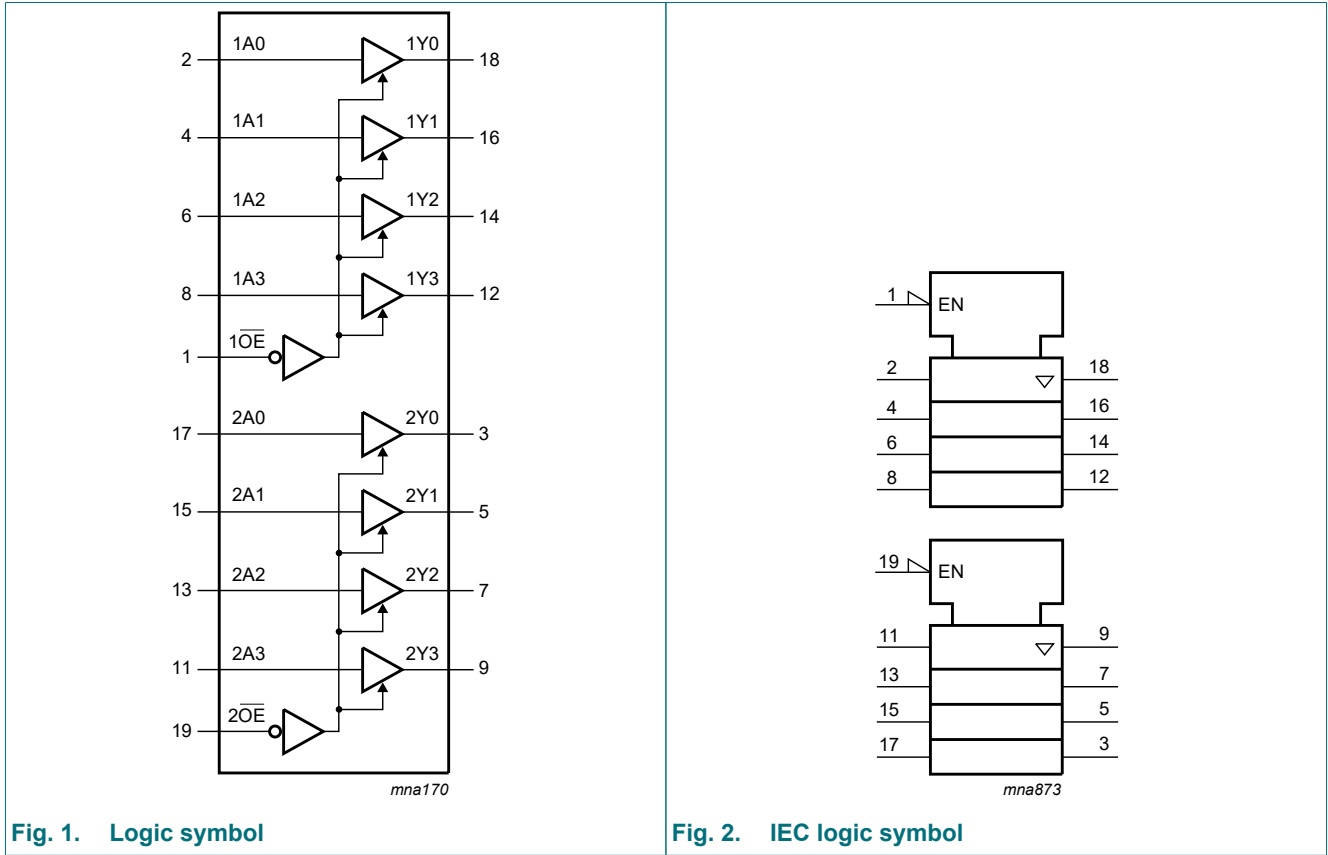
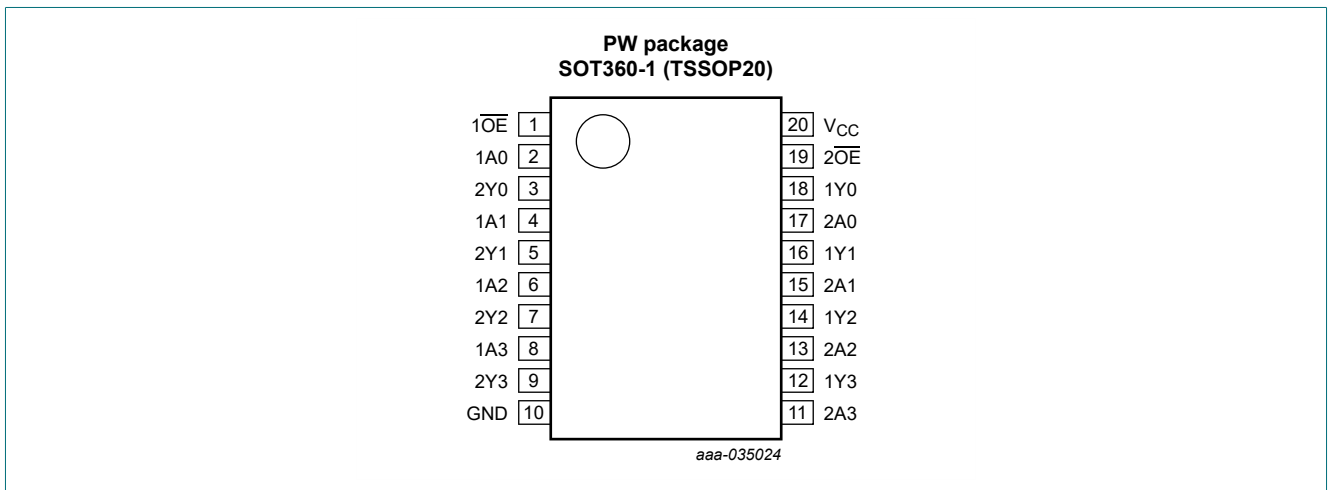


Fig. 1. Logic symbol

Fig. 2. IEC logic symbol

### 5. Pinning information

#### 5.1. Pinning



## 5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
1OE, 2OE	1, 19	output enable input (active LOW)
1A0, 1A1, 1A2, 1A3	2, 4, 6, 8	data input
2Y0, 2Y1, 2Y2, 2Y3	3, 5, 7, 9	data output
GND	10	ground (0 V)
2A0, 2A1, 2A2, 2A3	17, 15, 13, 11	data input
1Y0, 1Y1, 1Y2, 1Y3,	18, 16, 14, 12	data output

## 6. Functional description

Table 3. Function table

H = HIGH voltage level; L = LOW voltage level; X = don't care; Z = high-impedance OFF-state.

Control	Input	Output
nOE	nAn	nYn
L	L	L
L	H	H
H	X	Z

## 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 <sub>CC</sub>	supply voltage		-0.5	+7.0	V
V <sub>I</sub>	input voltage	[1]	-0.5	+7.0	V
V <sub>O</sub>	output voltage	active mode [2] [3]	-0.5	V <sub>CC</sub> + 0.5	V
		power-down or 3-state mode [2]	-0.5	+7.0	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < 0 V	-20	-	mA
I <sub>OK</sub>	output clamping current	V <sub>O</sub> < 0 V	-50	-	mA
I <sub>O</sub>	output current	V <sub>O</sub> = 0 V to V <sub>CC</sub>	-	±35	mA
I <sub>CC</sub>	supply current		-	70	mA
I <sub>GND</sub>	ground current		-70	-	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 [4]	-	500	mW

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

[2] The output voltage ratings may be exceeded if the output current ratings are observed.

[3] This value is limited to 7.0 V maximum.

[4] For SOT360-1 (TSSOP20) package: P<sub>tot</sub> derates linearly with 10.0 mW/K above 100 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

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

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		2.0	5.5	V
$V_I$	input voltage		0	5.5	V
$V_O$	output voltage	active mode	0	$V_{CC}$	V
		power-down or 3-state mode	0	5.5	V
$T_{amb}$	ambient temperature		-40	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	200	ns/V
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	-	100	ns/V
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	20	ns/V

## 9. Static characteristics

**Table 6. 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	
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 2\text{ V}$	1.5	-	-	1.5	-	1.5	-	V
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	$0.7V_{CC}$	-	-	$0.7V_{CC}$	-	$0.7V_{CC}$	-	V
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	$0.7V_{CC}$	-	-	$0.7V_{CC}$	-	$0.7V_{CC}$	-	V
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	$0.7V_{CC}$	-	-	$0.7V_{CC}$	-	$0.7V_{CC}$	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 2\text{ V}$	-	-	0.5	-	0.5	-	0.5	V
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	-	$0.3V_{CC}$	-	$0.3V_{CC}$	-	$0.3V_{CC}$	V
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	-	-	$0.3V_{CC}$	-	$0.3V_{CC}$	-	$0.3V_{CC}$	V
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	$0.3V_{CC}$	-	$0.3V_{CC}$	-	$0.3V_{CC}$	V
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$								V
		$V_{CC} = 2.0\text{ V to }5.5\text{ V}; I_O = -50\text{ }\mu\text{A}$	$V_{CC}-0.1$	-	-	$V_{CC}-0.1$	-	$V_{CC}-0.1$	-	V
		$V_{CC} = 2.3\text{ V}; I_O = -2\text{ mA}$	2	-	-	2	-	2	-	V
		$V_{CC} = 3.0\text{ V}; I_O = -8\text{ mA}$	2.58	-	-	2.48	-	2.48	-	V
		$V_{CC} = 4.5\text{ V}; I_O = -16\text{ mA}$	3.94	-	-	3.8	-	3.8	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$								V
		$V_{CC} = 2.0\text{ V to }5.5\text{ V}; I_O = 50\text{ }\mu\text{A}$	-	-	0.1	-	0.1	-	0.1	V
		$V_{CC} = 2.3\text{ V}; I_O = 2\text{ mA}$	-	-	0.4	-	0.4	-	0.4	V
		$V_{CC} = 3.0\text{ V}; I_O = 8\text{ mA}$	-	-	0.36	-	0.44	-	0.44	V
		$V_{CC} = 4.5\text{ V}; I_O = 16\text{ mA}$	-	-	0.44	-	0.55	-	0.55	V
$I_{OZ}$	OFF-state output current	$V_{CC} = 5.5\text{ V}; V_I = V_{IH}$ or $V_{IL}; V_O = \text{GND to }5.5\text{ V}$	-	-	$\pm 0.25$	-	$\pm 2.5$	-	$\pm 2.5$	$\mu\text{A}$
$I_{OFF}$	power-off leakage current	$V_I$ or $V_O = \text{GND to }5.5\text{ V}; V_{CC} = 0\text{ V}$	-	-	0.5	-	5	-	5	$\mu\text{A}$

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
$I_I$	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 0\text{ V to }5.5\text{ V}$	-	-	$\pm 0.1$	-	$\pm 1$	-	$\pm 1$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = V_{CC}$ or GND; $I_O = 0\text{ A}$ ; $V_{CC} = 5.5\text{ V}$	-	-	2	-	20	-	20	$\mu\text{A}$

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

$GND = 0\text{ V}$ . For test circuit see Fig. 5.

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
$t_{pd}$	propagation delay	$nA_n$ to $nY_n$ ; see Fig. 3 [2]								
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$								
		$C_L = 15\text{ pF}$	-	4.9	12.5	1	15	1	15	ns
		$C_L = 50\text{ pF}$	-	6.8	15.3	1	18	1	18	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$								
		$C_L = 15\text{ pF}$	-	3.7	8.4	1	10	1	10	ns
		$C_L = 50\text{ pF}$	-	5.2	11.9	1	13.5	1	13.5	ns
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$								
		$C_L = 15\text{ pF}$	-	2.9	5.5	1	6.5	1	6.5	ns
		$C_L = 50\text{ pF}$	-	4.1	7.5	1	8.5	1	8.5	ns
$t_{en}$	enable time	$n\overline{OE}$ to $nY_n$ ; see Fig. 4 [2]								
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$								
		$C_L = 15\text{ pF}$	-	6.1	14.6	1	17	1	17	ns
		$C_L = 50\text{ pF}$	-	8.2	17.8	1	21	1	21	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$								
		$C_L = 15\text{ pF}$	-	4.6	10.6	1	12.5	1	12.5	ns
		$C_L = 50\text{ pF}$	-	6.3	14.1	1	16	1	16	ns
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$								
		$C_L = 15\text{ pF}$	-	3.2	7.3	1	8.5	1	8.5	ns
		$C_L = 50\text{ pF}$	-	4.4	9.3	1	10.5	1	10.5	ns
$t_{dis}$	disable time	$n\overline{OE}$ to $nY_n$ ; see Fig. 4 [2]								
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$								
		$C_L = 15\text{ pF}$	-	6.4	14.1	1	16	1	16	ns
		$C_L = 50\text{ pF}$	-	11.0	19.2	1	21	1	21	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$								
		$C_L = 15\text{ pF}$	-	5.1	11.7	1	13	1	13	ns
		$C_L = 50\text{ pF}$	-	8.5	16	1	18	1	18	ns
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$								
		$C_L = 15\text{ pF}$	-	4.0	12.2	1	13.5	1	13.5	ns
		$C_L = 50\text{ pF}$	-	6.2	14.2	1	15.5	1	15.5	ns

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
t <sub>sk(o)</sub>	skew	C <sub>L</sub> = 50 pF								
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	2	-	2	-	2	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	-	1.5	-	1.5	-	1.5	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	1	-	1	-	1	ns
C <sub>I</sub>	input capacitance	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 3.3 V	-	2	6	-	6	-	6	pF
C <sub>O</sub>	output capacitance	V <sub>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 3.3 V	-	5	-	-	-	-	-	pF
C <sub>PD</sub>	power dissipation capacitance	per buffer; [3] C <sub>L</sub> = 50 pF; f = 10 MHz; V <sub>I</sub> = GND to V <sub>CC</sub>								
		V <sub>CC</sub> = 3.3 V	-	9	-	-	-	-	-	pF
		V <sub>CC</sub> = 5.0 V	-	11	-	-	-	-	-	pF

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and V<sub>CC</sub> = 2.5 V, 3.3 V, and 5 V respectively, unless otherwise specified.

[2] 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>PLZ</sub> and t<sub>PHZ</sub>.

[3] 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> + Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) 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 Volts.

**Table 8. Noise characteristics**

GND = 0 V. For test circuit see Fig. 5.

Symbol	Parameter	Conditions	25 °C			Unit
			Min	Typ	Max	
<b>V<sub>CC</sub> = 3.3 V; C<sub>L</sub> = 50 pF</b>						
V <sub>OL(p)</sub>	LOW-level output voltage (peak)		-	0.3	0.8	V
V <sub>OL(v)</sub>	LOW-level output voltage (valley)		-0.8	-0.2	-	V
V <sub>OH(v)</sub>	HIGH-level output voltage (valley)		-	2.9	-	V
V <sub>IH(AC)</sub>	AC HIGH-level input voltage (dynamic)		2.31	-	-	V
V <sub>IL(AC)</sub>	AC LOW-level input voltage (dynamic)		-	-	0.99	V

10.1. Waveforms and test circuit

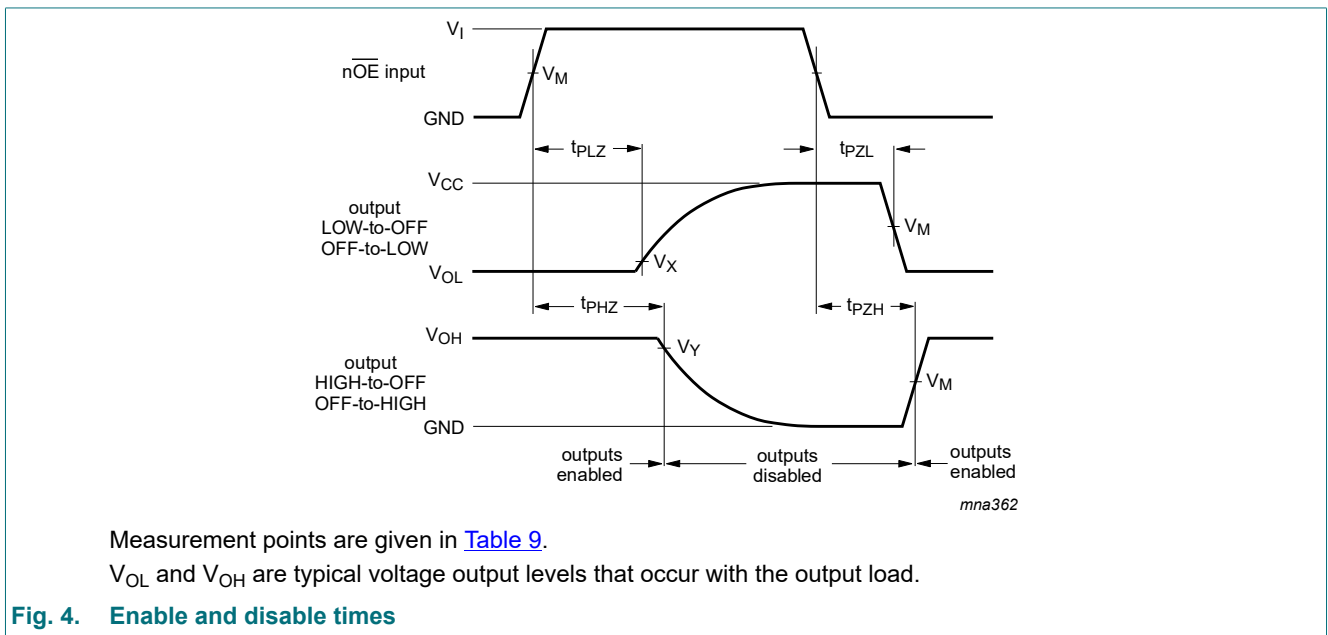
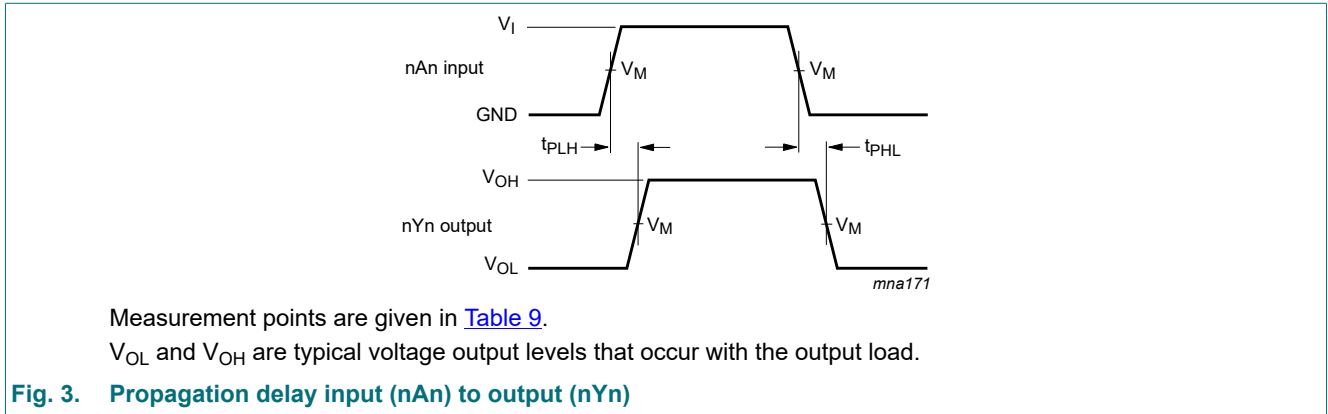


Table 9. Measurement points

Input	Output		
$V_M$	$V_M$	$V_X$	$V_Y$
$0.5V_{CC}$	$0.5V_{CC}$	$V_{OL} + 0.3 V$	$V_{OH} - 0.3 V$

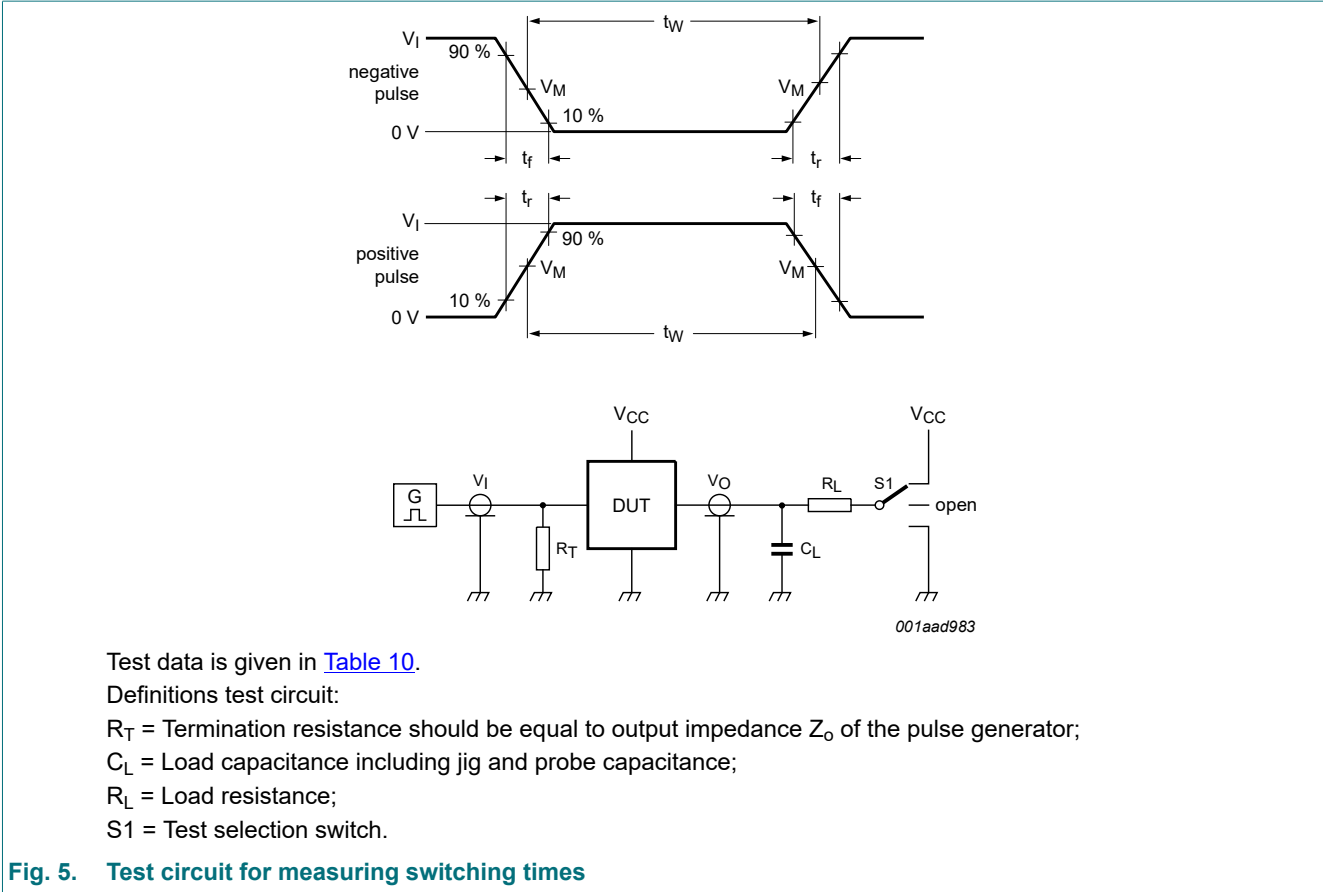


Fig. 5. Test circuit for measuring switching times

Table 10. Test data

Input		Load		S1 position		
$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
GND to $V_{CC}$	3.0 ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$



### 11. Package outline

TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm

SOT360-1

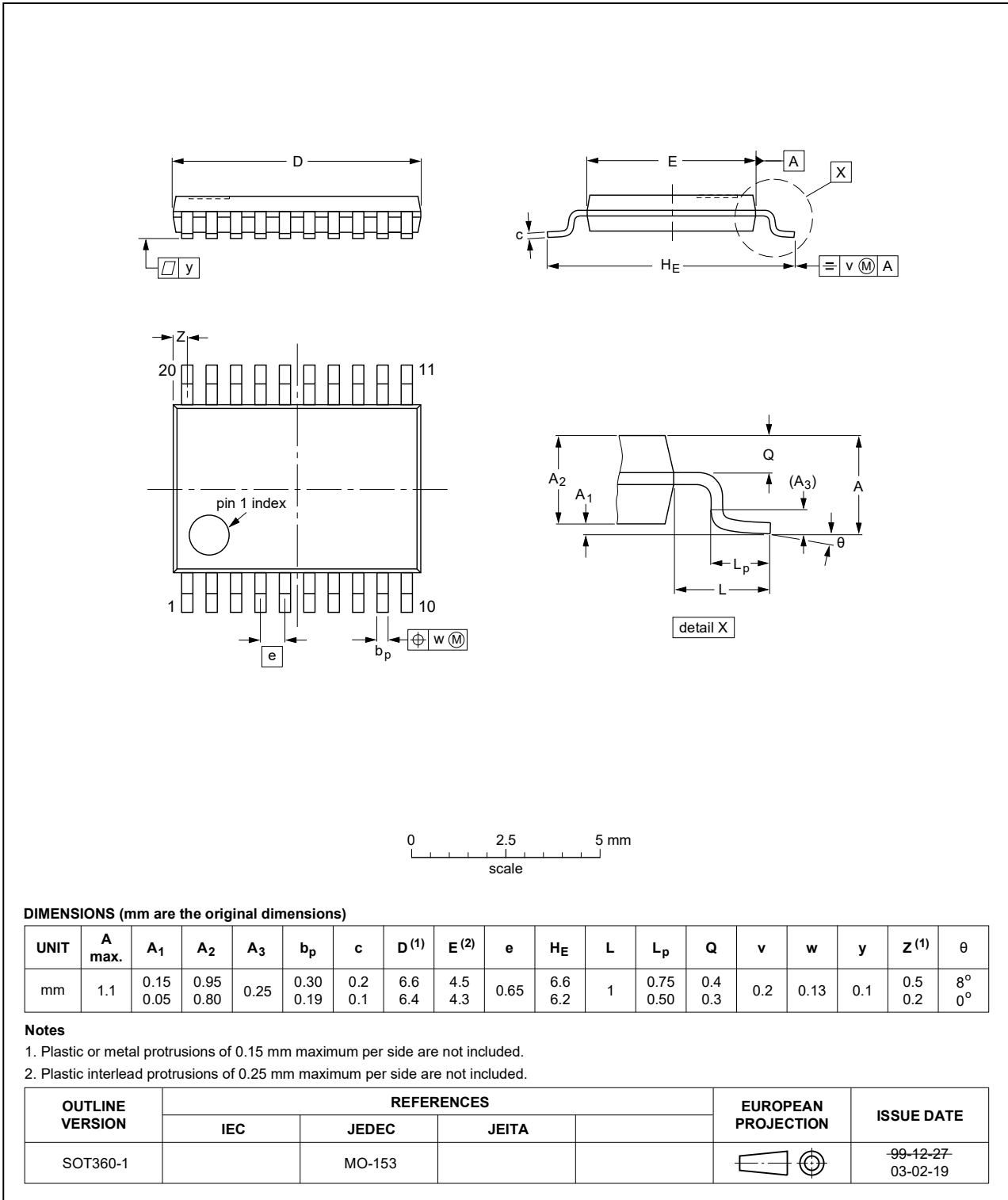


Fig. 6. Package outline SOT360-1 (TSSOP20)

## 12. Abbreviations

Table 11. Abbreviations

Acronym	Description
ANSI	American National Standards Institute
CDM	Charge Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
ESDA	ElectroStatic Discharge Association
HBM	Human Body Model
JEDEC	Joint Electron Device Engineering Council

## 13. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LV244A v.2	20240704	Product data sheet	-	74LV244A v.1
Modifications	<ul style="list-style-type: none"> <li><a href="#">Section 2</a>: ESD specification updated according to the latest JEDEC standard.</li> <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>			
74LV244A v.1	20161123	Product data sheet	-	-

## 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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