

# 74LV244

## Octal buffer/line driver; 3-state

Rev. 6 — 4 July 2024

Product data sheet

### 1. General description

The 74LV244 is an 8-bit buffer/line driver with 3-state outputs. The device can be used as two 4-bit buffers or one 8-bit buffer. The device features two output enables (1OE and 2OE), each controlling four of the 3-state outputs. A HIGH on nOE causes the outputs to assume a high-impedance OFF-state. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess  $V_{CC}$ .

### 2. Features and benefits

- Wide supply voltage range from 1.0 V to 5.5 V
- CMOS low power dissipation
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level B
- Optimized for low voltage applications: 1.0 V to 3.6 V
- Accepts TTL input levels between  $V_{CC} = 2.7$  V and  $V_{CC} = 3.6$  V
- Typical  $V_{OLP}$  (output ground bounce)  $< 0.8$  V at  $V_{CC} = 3.3$  V;  $T_{amb} = 25$  °C
- Typical  $V_{OHV}$  (output  $V_{OH}$  undershoot)  $> 2$  V at  $V_{CC} = 3.3$  V;  $T_{amb} = 25$  °C
- Complies with JEDEC standards:
  - JESD8-7 (1.65 V to 1.95 V)
  - JESD8-5 (2.3 V to 2.7 V)
  - JESD8C (2.7 V to 3.6 V)
  - JESD36 (4.5 V to 5.5 V)
- 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 from -40 °C to +125 °C

### 3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
<a href="#">74LV244D</a>	-40 °C to +125 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	<a href="#">SOT163-1</a>
<a href="#">74LV244PW</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. Block diagram

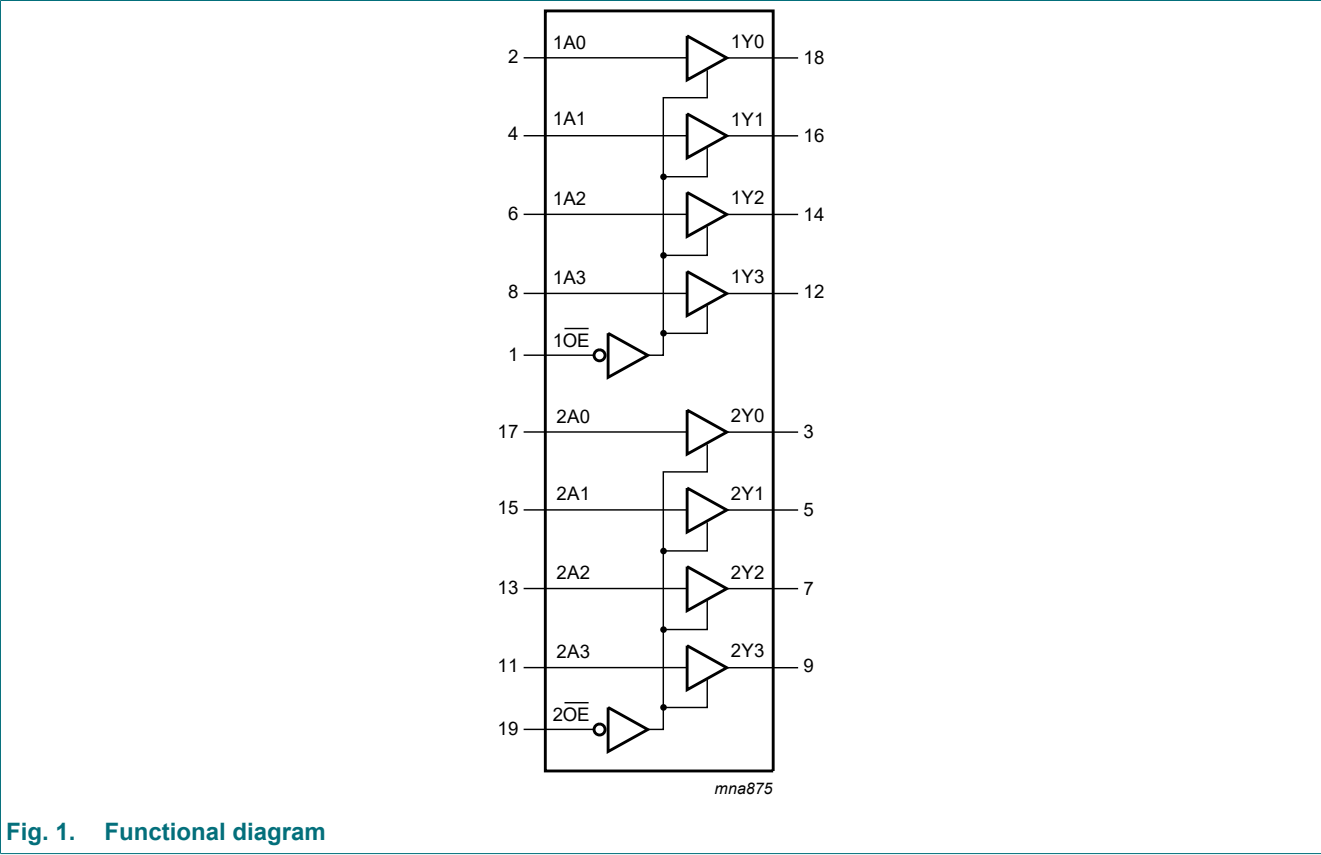


Fig. 1. Functional diagram

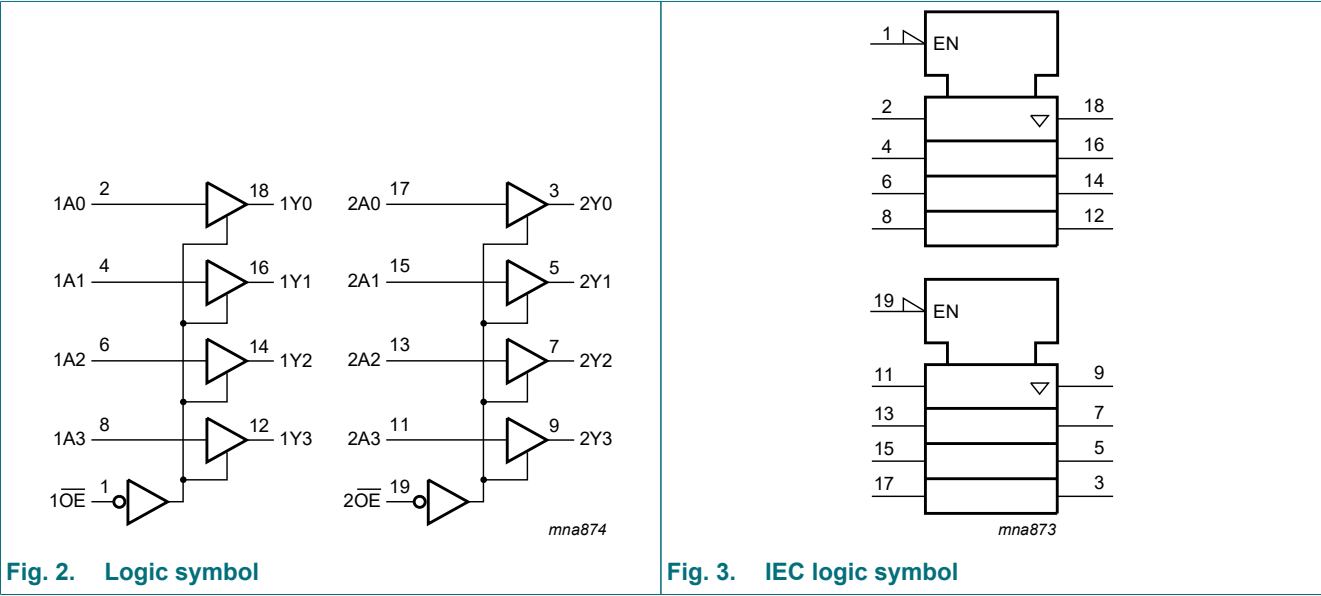
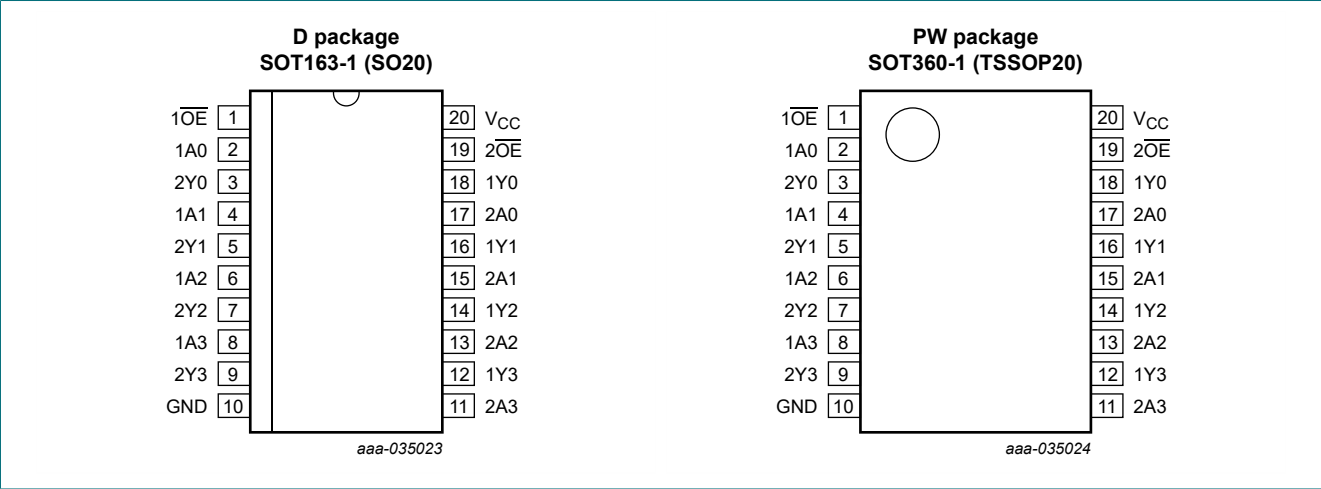


Fig. 2. Logic symbol

Fig. 3. IEC logic symbol

5. Pinning information

5.1. Pinning



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
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < -0.5 V or V <sub>I</sub> > V <sub>CC</sub> + 0.5 V	-	±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	-	±50	mA
I <sub>O</sub>	output current	-0.5 V < V <sub>O</sub> < V <sub>CC</sub> + 0.5 V	-	±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 [1]	-	500	mW

[1] For SOT163-1 (SO20) package: P<sub>tot</sub> derates linearly with 12.3 mW/K above 109 °C.  
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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>CC</sub>	supply voltage	[1]	1.0	3.3	5.5	V
V <sub>I</sub>	input voltage		0	-	V <sub>CC</sub>	V
V <sub>O</sub>	output voltage		0	-	V <sub>CC</sub>	V
T <sub>amb</sub>	ambient temperature		-40	-	+125	°C
Δt/ΔV	input transition rise and fall rate	V <sub>CC</sub> = 1.0 V to 2.0 V	0	-	500	ns/V
		V <sub>CC</sub> = 2.0 V to 2.7 V	0	-	200	ns/V
		V <sub>CC</sub> = 2.7 V to 3.6 V	0	-	100	ns/V
		V <sub>CC</sub> = 3.6 V to 5.5 V	0	-	50	ns/V

[1] The LV is guaranteed to function down to V<sub>CC</sub> = 1.0 V (input levels GND or V<sub>CC</sub>). DC characteristics are guaranteed from V<sub>CC</sub> = 1.2 V to V<sub>CC</sub> = 5.5 V.

9. Static characteristics

Table 6. Static characteristics

Over recommended operating conditions. Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
V <sub>IH</sub>	HIGH level input voltage	V <sub>CC</sub> = 1.2 V	0.9	-	-	0.9	-	V
		V <sub>CC</sub> = 2.0 V	1.4	-	-	1.4	-	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	2.0	-	-	2.0	-	V
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.7 × V <sub>CC</sub>	-	-	0.7 × V <sub>CC</sub>	-	V
V <sub>IL</sub>	LOW level input voltage	V <sub>CC</sub> = 1.2 V	-	-	0.3	-	0.3	V
		V <sub>CC</sub> = 2.0 V	-	-	0.6	-	0.6	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	-	-	0.8	-	0.8	V
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	0.3 × V <sub>CC</sub>	-	0.3 × V <sub>CC</sub>	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> = -100 µA						
		V <sub>CC</sub> = 1.2 V	-	1.2	-	-	-	V
		V <sub>CC</sub> = 2.0 V	1.8	2.0	-	1.8	-	V
		V <sub>CC</sub> = 2.7 V	2.5	2.7	-	2.5	-	V
		V <sub>CC</sub> = 3.0 V	2.8	3.0	-	2.8	-	V
		V <sub>CC</sub> = 4.5 V	4.3	4.5	-	4.3	-	V
		V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>						
		V <sub>CC</sub> = 3.0 V; I <sub>O</sub> = -8 mA	2.40	2.82	-	2.20	-	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> = 100 µA						
		V <sub>CC</sub> = 1.2 V	-	0	-	-	-	V
		V <sub>CC</sub> = 2.0 V	-	0	0.2	-	0.2	V
		V <sub>CC</sub> = 2.7 V	-	0	0.2	-	0.2	V
		V <sub>CC</sub> = 3.0 V	-	0	0.2	-	0.2	V
		V <sub>CC</sub> = 4.5 V	-	0	0.2	-	0.2	V
		V <sub>CC</sub> = 3.0 V; I <sub>O</sub> = 8 mA	-	0.25	0.40	-	0.50	V
		V <sub>CC</sub> = 4.5 V; I <sub>O</sub> = 16 mA	-	0.35	0.55	-	0.65	V
I <sub>I</sub>	input leakage current	V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = V <sub>CC</sub> or GND	-	-	1.0	-	1.0	µA
I <sub>OZ</sub>	3-State output OFF-state current	V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = V <sub>CC</sub> or GND	-	-	5	-	10	µA
I <sub>CC</sub>	supply current	V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A	-	-	20	-	160	µA
ΔI <sub>CC</sub>	additional supply current	per input; V <sub>CC</sub> = 2.7 V to 3.6 V; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V	-	-	500	-	850	µA
C <sub>I</sub>	input capacitance		-	3.5	-	-	-	pF

[1] All typical values are measured at T<sub>amb</sub> = 25 °C.

10. Dynamic characteristics

Table 7. Dynamic characteristics

GND (ground = 0 V); for test circuit, see Fig. 6

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
t <sub>pd</sub>	propagation delay	1An to 1Yn; 2An to 2Yn; see Fig. 4 [2]						
		V <sub>CC</sub> = 1.2 V	-	50		-	-	ns
		V <sub>CC</sub> = 2.0 V	-	17	24	-	31	ns
		V <sub>CC</sub> = 2.7 V	-	13	17	-	23	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	9	14	-	18	ns
		V <sub>CC</sub> = 3.3 V; C <sub>L</sub> = 15 pF	-	8	-	-	-	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	12	-	15	ns
t <sub>en</sub>	enable time	1 $\overline{\text{OE}}$ to 1Yn; 2 $\overline{\text{OE}}$ to 2Yn; see Fig. 5 [2]						
		V <sub>CC</sub> = 1.2 V	-	65	-	-	-	ns
		V <sub>CC</sub> = 2.0 V	-	22	39	-	49	ns
		V <sub>CC</sub> = 2.7 V	-	16	29	-	36	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	12	23	-	29	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	19	-	24	ns
t <sub>dis</sub>	disable time	1 $\overline{\text{OE}}$ to 1Yn; 2 $\overline{\text{OE}}$ to 2Yn; see Fig. 5 [2]						
		V <sub>CC</sub> = 1.2 V	-	60	-	-	-	ns
		V <sub>CC</sub> = 2.0 V	-	22	34	-	43	ns
		V <sub>CC</sub> = 2.7 V	-	17	24	-	32	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	13	21	-	26	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	16	-	19	ns
C <sub>PD</sub>	power dissipation capacitance	V <sub>I</sub> = GND to V <sub>CC</sub> ; V <sub>CC</sub> = 3.3 V [3]	-	35	-	-	-	ns

- [1] Unless otherwise stated, all typical values are measured at T<sub>amb</sub> = 25 °C and nominal V<sub>CC</sub>.
- [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> in μW):  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i + \Sigma (C_L \times V_{CC}^2 \times f_o)$ , where:  
f<sub>i</sub> = input frequency in MHz;  
f<sub>o</sub> = output frequency in MHz;  
Σ (C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of outputs;  
C<sub>L</sub> = output load capacitance in pF;  
V<sub>CC</sub> = supply voltage in V.

10.1. Waveforms and test circuit

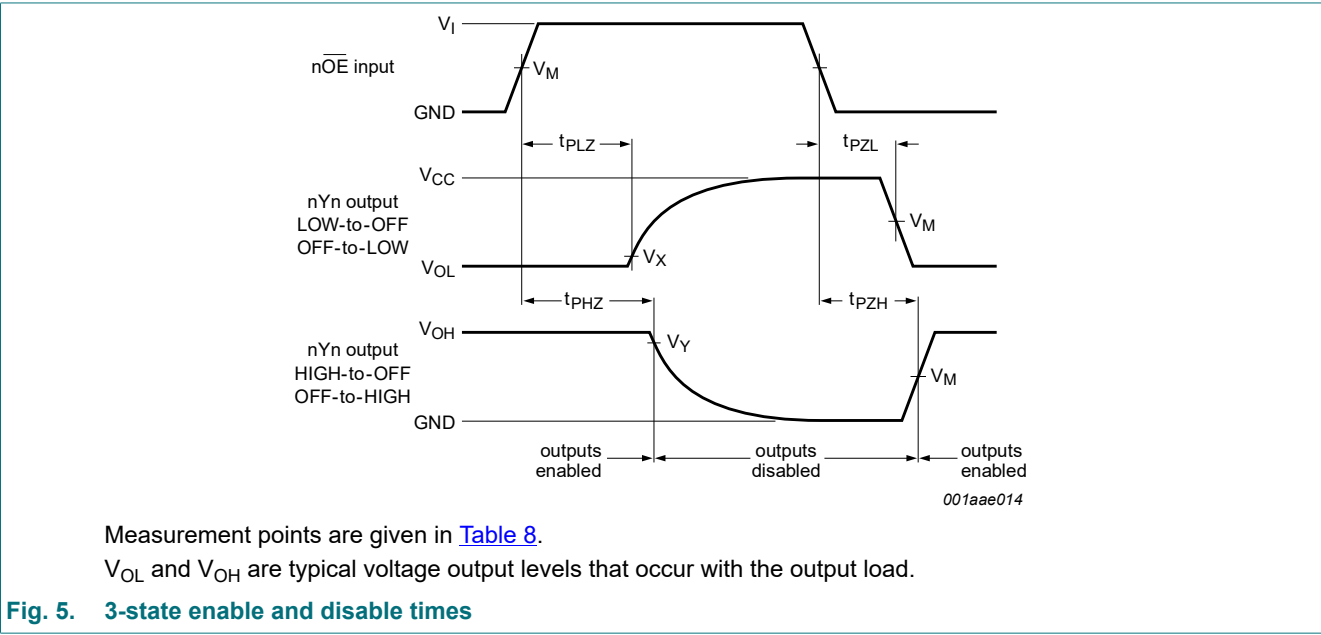
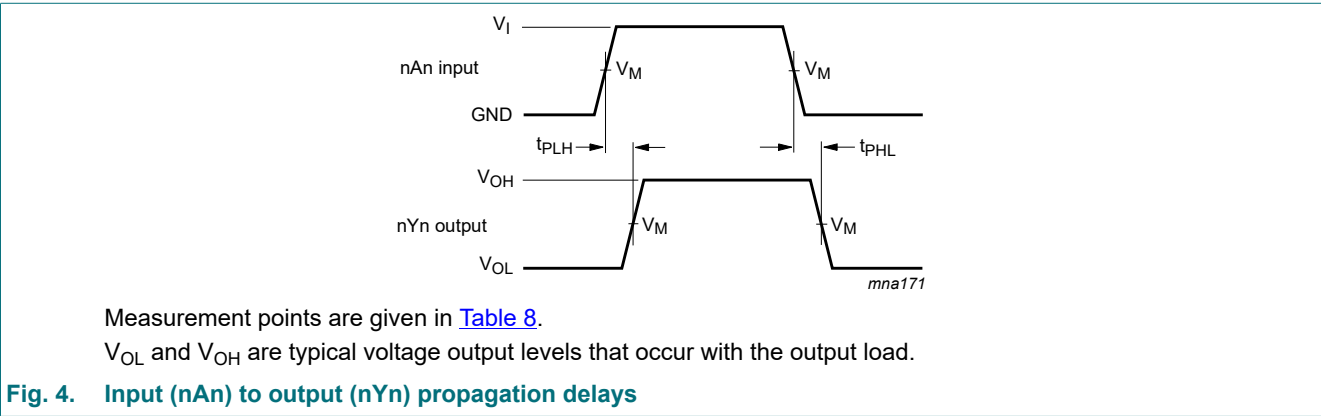
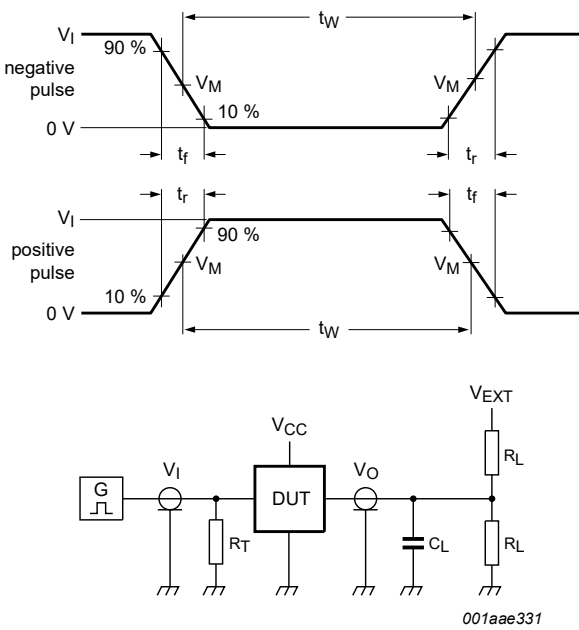


Table 8. Measurement points

Supply voltage	Input	Output		
$V_{CC}$	$V_M$	$V_M$	$V_X$	$V_Y$
< 2.7 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.1 \times V_{CC}$	$V_{OH} - 0.1 \times V_{CC}$
2.7 V to 3.6 V	1.5 V	1.5 V	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$
$\geq 4.5 \text{ V}$	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.1 \times V_{CC}$	$V_{OH} - 0.1 \times V_{CC}$



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;  
 $S1$  = Test selection switch.

Fig. 6. Test circuit for measuring switching times

Table 9. Test data

Supply voltage	Input		Load		$V_{EXT}$		
$V_{CC}$	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
< 2.7 V	$V_{CC}$	$\leq 2.5$ ns	50 pF	1 k $\Omega$	open	GND	$2 \times V_{CC}$
2.7 V to 3.6 V	2.7 V	$\leq 2.5$ ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$2 \times V_{CC}$
$\geq 4.5$ V	$V_{CC}$	$\leq 2.5$ ns	50 pF	1 k $\Omega$	open	GND	$2 \times V_{CC}$



11. Package outline

SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1

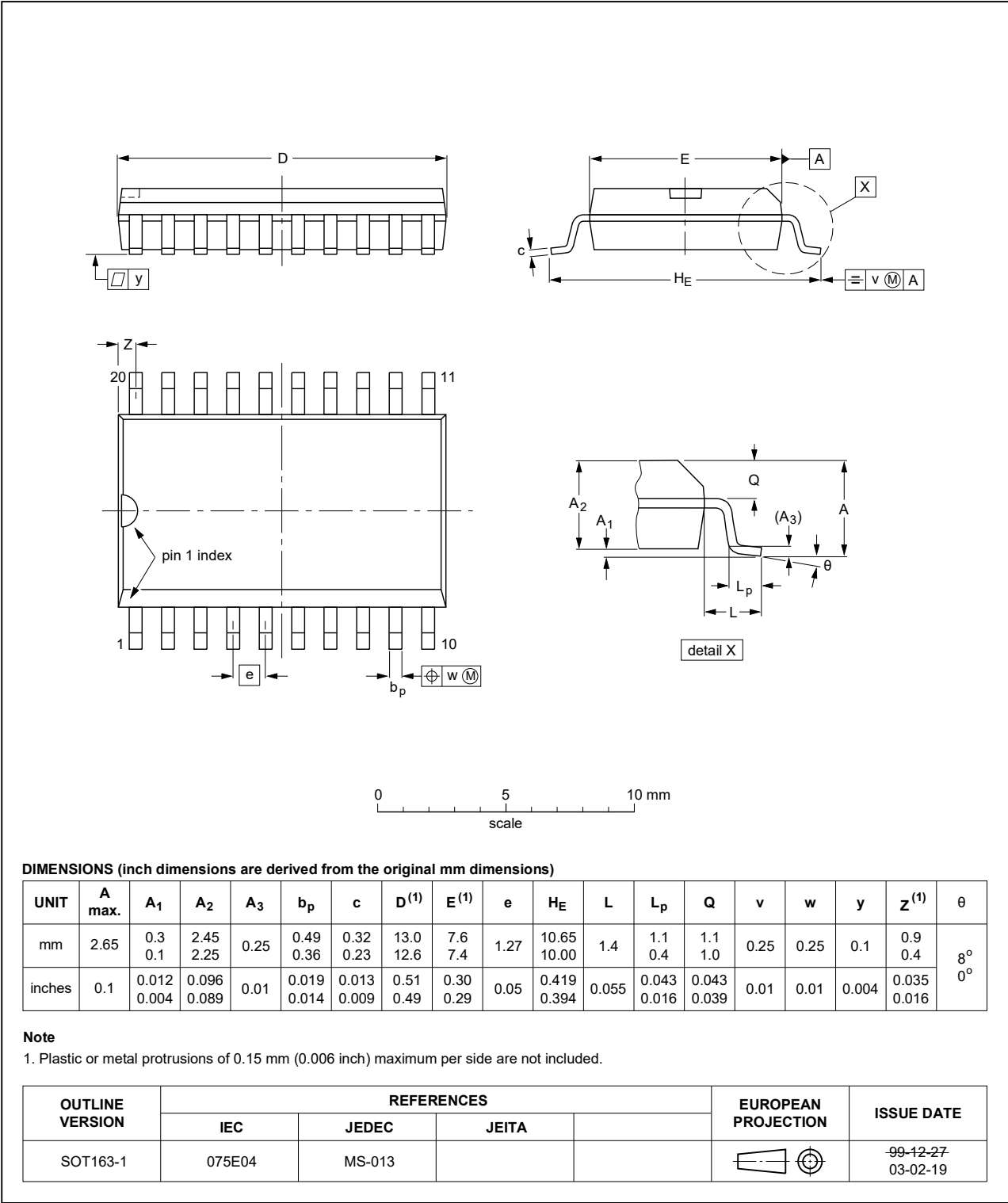


Fig. 7. Package outline SOT163-1 (SO20)

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

SOT360-1

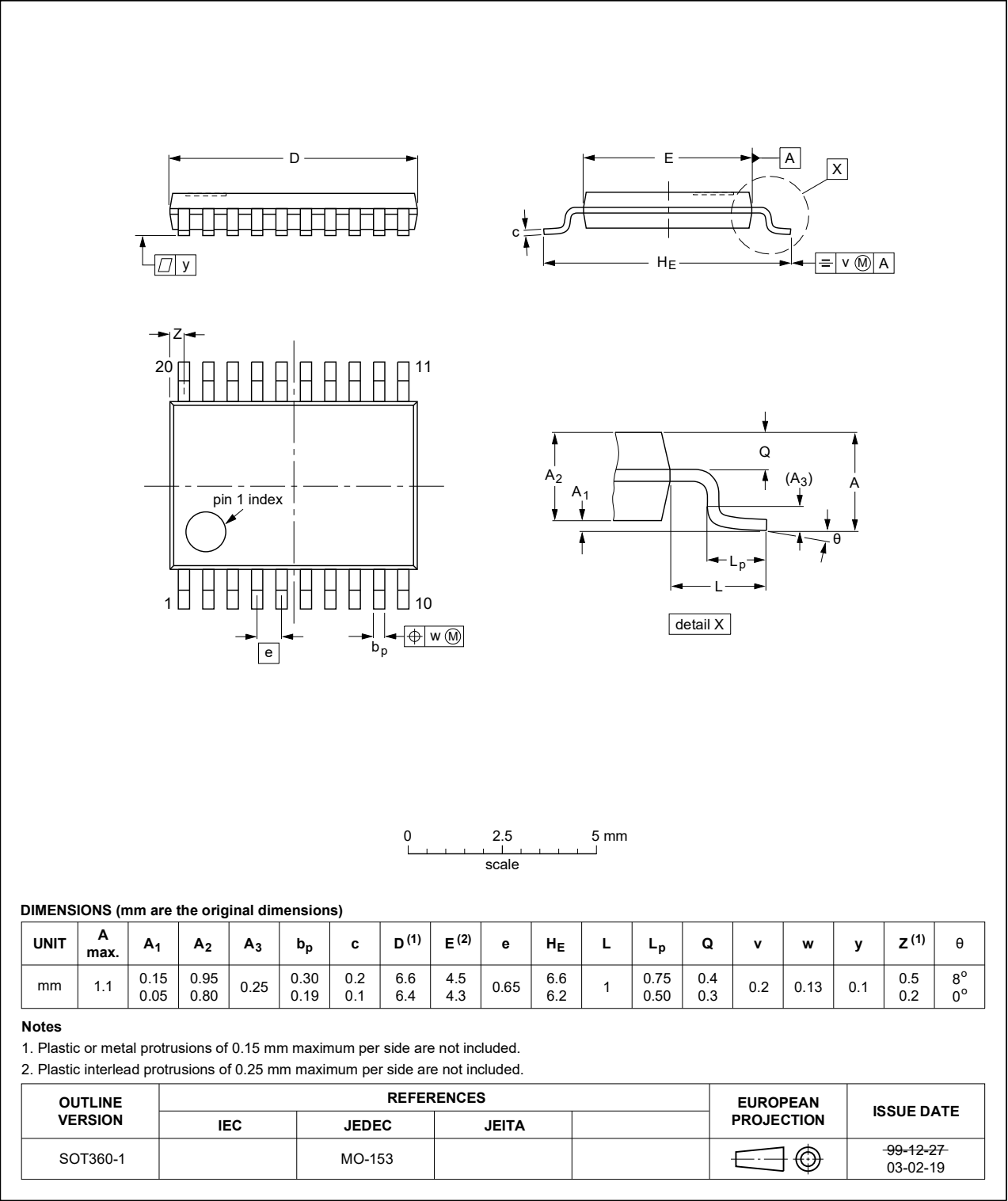


Fig. 8. Package outline SOT360-1 (TSSOP20)

12. Abbreviations

Table 10. Abbreviations

Acronym	Description
ANSI	American National Standards Institute
CDM	Charge Device Model
CMOS	Complementary Metal Oxide Semiconductor
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

13. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LV244 v.6	20240704	Product data sheet	-	74LV244 v.5
Modifications:	<ul style="list-style-type: none"><li>Section 2: ESD specification updated according to the latest JEDEC standard.</li></ul>			
74LV244 v.5	20210924	Product data sheet	-	74LV244 v.4
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>Section 1 and Section 2 updated.</li><li>Section 7: Derating values for P<sub>tot</sub> total power dissipation updated.</li><li>Type number 74LV244DB (SOT339-1/SSOP20) removed.</li></ul>			
74LV244 v.4	20160301	Product data sheet	-	74LV244 v.3
Modifications:	<ul style="list-style-type: none"><li>Type number 74LV244N (SOT146-1) removed.</li></ul>			
74LV244 v.3	20140311	Product data sheet	-	74LV244 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>			
74LV244 v.2	19980520	Product specification	-	74LV244 v.1
74LV244 v.1	-	-	-	-

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### 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.
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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.
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Contents

1. General description..... 1

2. Features and benefits..... 1

3. Ordering information..... 1

4. Block diagram..... 2

5. Pinning information..... 3

5.1. Pinning..... 3

5.2. Pin description..... 3

6. Functional description..... 3

7. Limiting values..... 4

8. Recommended operating conditions..... 4

9. Static characteristics..... 5

10. Dynamic characteristics..... 6

10.1. Waveforms and test circuit..... 7

11. Package outline..... 9

12. Abbreviations..... 11

13. Revision history..... 11

14. Legal information..... 12

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