74LV244

Octal buffer/line driver; 3-state Rev. 5 — 24 September 2021

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 (1 \overline{OE} and 2 \overline{OE}), each controlling four of the 3-state outputs. A HIGH on n \overline{OE} 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 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 JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C

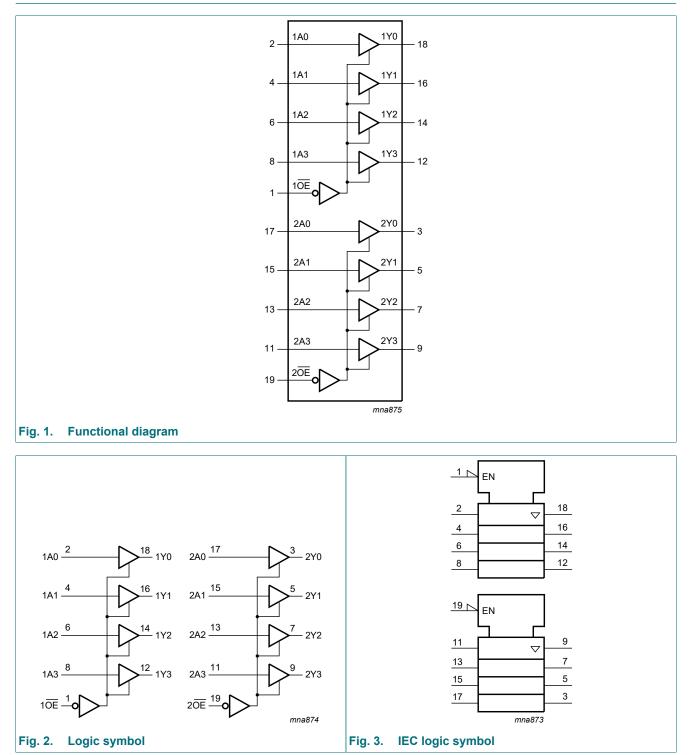
3. Ordering information

Table 1. Orderi	Table 1. Ordering information							
Type number	Package							
	Temperature range	Name	Description	Version				
74LV244D	-40 °C to +125 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1				
74LV244PW	-40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1				

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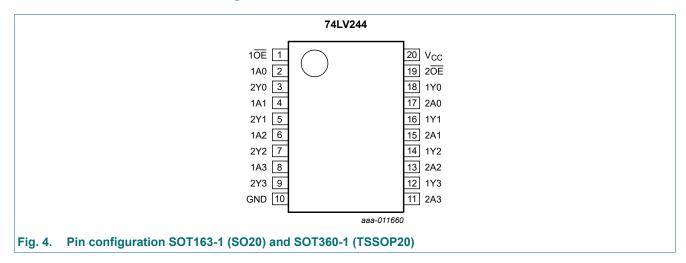
Octal buffer/line driver; 3-state

4. Block diagram



5. Pinning information

5.1. Pinning



5.2. Pin description

Symbol	Pin	Description
1 <u>0E</u> , 2 <u>0E</u>	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	bus output
GND	10	ground (0 V)
2A0, 2A1, 2A2, 2A3	17, 15, 13, 11	data input
1Y0, 1Y1, 1Y2, 1Y3	18, 16, 14, 12	bus output
V _{CC}	20	supply voltage

6. Functional description

Table 3. Function table

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

Input nOE	Output	
nOE	nAn	nYn
L	L	L
L	Н	Н
Н	X	Z

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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	+7.0	V
l _{IK}	input clamping current	V_{I} < -0.5 V or V_{I} > V_{CC} + 0.5 V		-	±20	mA
I _{OK}	output clamping current	$V_{\rm O}$ < -0.5 V or $V_{\rm O}$ > $V_{\rm CC}$ + 0.5 V		-	±50	mA
lo	output current	$-0.5 V < V_O < V_{CC} + 0.5 V$		-	±35	mA
I _{CC}	supply current			-	70	mA
I _{GND}	ground current			-70	-	mA
T _{stg}	storage temperature			-65	+150	°C
P _{tot}	total power dissipation	T _{amb} = -40 °C to +125 °C	[1]	-	500	mW

For SOT163-1 (SO20) package: P_{tot} derates linearly with 12.3 mW/K above 109 °C.
 For SOT360-1 (TSSOP20) package: P_{tot} derates linearly with 10.0 mW/K above 100 °C.

8. Recommended operating conditions

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
V _{CC}	supply voltage		[1]	1.0	3.3	5.5	V
VI	input voltage			0	-	V _{CC}	V
Vo	output voltage			0	-	V _{CC}	V
T _{amb}	ambient temperature			-40	-	+125	°C
Δt/ΔV	input transition rise and fall	V _{CC} = 1.0 V to 2.0 V		0	-	500	ns/V
	rate	V _{CC} = 2.0 V to 2.7 V		0	-	200	ns/V
	V _{CC} = 2.7 V to 3.6 V		0	-	100	ns/V	
		V _{CC} = 3.6 V to 5.5 V		0	-	50	ns/V

Table 5. Recommended operating conditions

[1] The LV is guaranteed to function down to V_{CC} = 1.0 V (input levels GND or V_{CC}). DC characteristics are guaranteed from V_{CC} = 1.2 V to V_{CC} = 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	Unit	
			Min	Typ[1]	Max	Min	Мах	
V _{IH}	HIGH level input voltage	V _{CC} = 1.2 V	0.9	-	-	0.9		V
		V _{CC} = 2.0 V	1.4	-	-	1.4		V
		V _{CC} = 2.7 V to 3.6 V	2.0	-	-	2.0		V
		V _{CC} = 4.5 V to 5.5 V	0.7V _{CC}	-	-	0.7V _{CC}		V
V _{IL}	LOW level input voltage	V _{CC} = 1.2 V	-	-	0.3		0.3	V
		V _{CC} = 2.0 V	-	-	0.6		0.6	V
		V _{CC} = 2.7 V to 3.6 V	-	-	0.8		0.8	V
		V _{CC} = 4.5 V to 5.5 V	-	-	0.3V _{CC}		0.3V _{CC}	V
V _{OH}	HIGH level output voltage	$V_I = V_{IH}$ or V_{IL} ; $I_O = -100 \ \mu A$						
		V _{CC} = 1.2 V	-	1.2	-	-	-	V
		V _{CC} = 2.0 V	1.8	2.0	-	1.8	-	V
		V _{CC} = 2.7 V	2.5	2.7	-	2.5	-	V
		V _{CC} = 3.0 V	2.8	3.0	-	2.8	-	V
		V _{CC} = 4.5 V	4.3	4.5	-	4.3	-	V
		V _I = V _{IH} or V _{IL}						
		V _{CC} = 3.0 V; I _O = -8 mA	2.40	2.82	-	2.20	-	V
		V _{CC} = 4.5 V; I _O = -16 mA	3.60	4.20	-	3.50	-	V
V _{OL}	LOW level output voltage	$V_I = V_{IH} \text{ or } V_{IL}; I_O = 100 \ \mu\text{A}$						
		V _{CC} = 1.2 V	-	0	-	-	-	V
		V _{CC} = 2.0 V	-	0	0.2	-	0.2	V
		V _{CC} = 2.7 V	-	0	0.2	-	0.2	V
		V _{CC} = 3.0 V	-	0	0.2	-	0.2	V
		V _{CC} = 4.5 V	-	0	0.2	-	0.2	V
		V _{CC} = 3.0 V; I _O = 8 mA	-	0.25	0.40	-	0.50	V
		V _{CC} = 4.5 V; I _O = 16 mA	-	0.35	0.55	-	0.65	V
l _l	input leakage current	V_{CC} = 5.5 V; V_{I} = V_{CC} or GND	-	-	1.0	-	1.0	μA
I _{OZ}	3-State output OFF-state current	V_{CC} = 3.6 V; V_I = V_{IH} or V_{IL} ; V_O = V_{CC} or GND	-	-	5	-	10	μA
I _{CC}	supply current	$V_{CC} = 5.5 \text{ V}; V_I = V_{CC} \text{ or GND};$ $I_O = 0 \text{ A}$	-	-	20	-	160	μA
ΔI _{CC}	additional supply current	per input; V_{CC} = 2.7 V to 3.6 V; V _I = V _{CC} - 0.6 V	-	-	500	-	850	μA
CI	input capacitance		-	3.5	-	-	-	pF

[1] All typical values are measured at T_{amb} = 25 °C.

10. Dynamic characteristics

Table 7. Dynamic characteristics

GND (ground = 0 V); for test circuit, see Fig. 7

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to	Unit	
				Typ[1]	Мах	Min	Max	1
t _{pd} propagation		1An to 1Yn; 2An to 2Yn; see Fig. 5 [2]						
	delay	V _{CC} = 1.2 V	-	50		-	-	ns
		V _{CC} = 2.0 V	-	17	24	-	31	ns
		V _{CC} = 2.7 V	-	13	17	-	23	ns
		V _{CC} = 3.0 V to 3.6 V	-	9	14	-	18	ns
		V _{CC} = 3.3 V; C _L = 15 pF	-	8	-	-	-	ns
		V _{CC} = 4.5 V to 5.5 V	-	-	12	-	15	ns
t _{en}	enable time	10E to 1Yn; 20E to 2Yn; see Fig. 6 [2]						
		V _{CC} = 1.2 V	-	65	-	-	-	ns
		V _{CC} = 2.0 V	-	22	39	-	49	ns
		V _{CC} = 2.7 V	-	16	29	-	36	ns
		V _{CC} = 3.0 V to 3.6 V	-	12	23	-	29	ns
		V _{CC} = 4.5 V to 5.5 V	-	-	19	-	24	ns
t _{dis}	disable time	10E to 1Yn; 20E to 2Yn; see Fig. 6 [2]						
		V _{CC} = 1.2 V	-	60		-	-	ns
		V _{CC} = 2.0 V	-	22	34	-	43	ns
		V _{CC} = 2.7 V	-	17	24	-	32	ns
		V _{CC} = 3.0 V to 3.6 V	-	13	21	-	26	ns
		V _{CC} = 4.5 V to 5.5 V	-	-	16	-	19	ns
C _{PD}	power dissipation capacitance	$V_1 = GND \text{ to } V_{CC}; V_{CC} = 3.3 \text{ V}$ [3]	-	35	-	-	-	ns

Unless otherwise stated, all typical values are measured at T_{amb} = 25 °C and nominal V_{CC}. [1]

[2] t_{pd} is the same as t_{PLH} and t_{PHL} . $t_{en} \mbox{ is the same as } t_{PZL} \mbox{ and } t_{PZH}.$

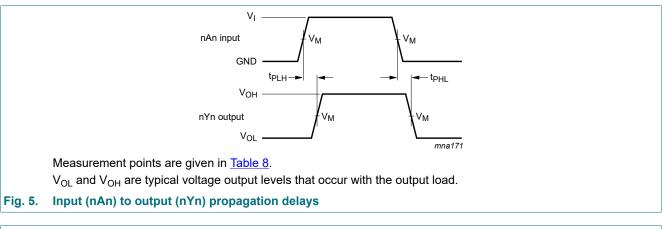
 t_{dis} is the same as t_{PLZ} and t_{PHZ} . [3] C_{PD} is used to determine the dynamic power dissipation $P_D = C_{PD} \times V_{CC}^2 \times f_i + \Sigma (C_L \times V_{CC}^2 \times f_o) (P_D \text{ in } \mu W)$, where: f_i = input frequency in MHz;

f_o = output frequency in MHz;

 Σ (C_L x V_{CC}² x f_o) = sum of outputs;

C_L = output load capacitance in pF;

V_{CC} = supply voltage in V.



10.1. Waveforms and test circuit

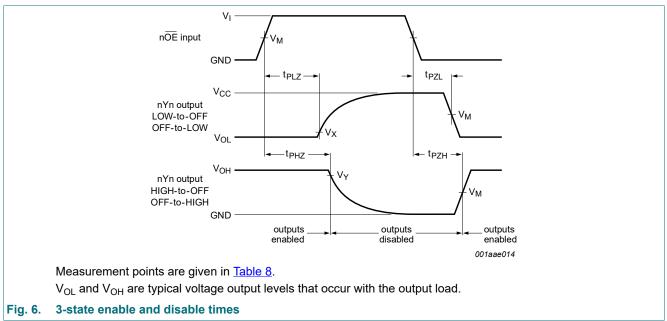


Table 8. Measurement points

Supply voltage	Input	Output	Output			
V _{cc}	V _M	V _M	V _X	V _Y		
< 2.7 V	0.5V _{CC}	0.5V _{CC}	V _{OL} + 0.1V _{CC}	V _{OH} - 0.1V _{CC}		
2.7 V to 3.6 V	1.5 V	1.5 V	V _{OL} + 0.3 V	V _{OH} - 0.3 V		
≥ 4.5 V	0.5V _{CC}	0.5V _{CC}	V _{OL} + 0.1V _{CC}	V _{OH} - 0.1V _{CC}		

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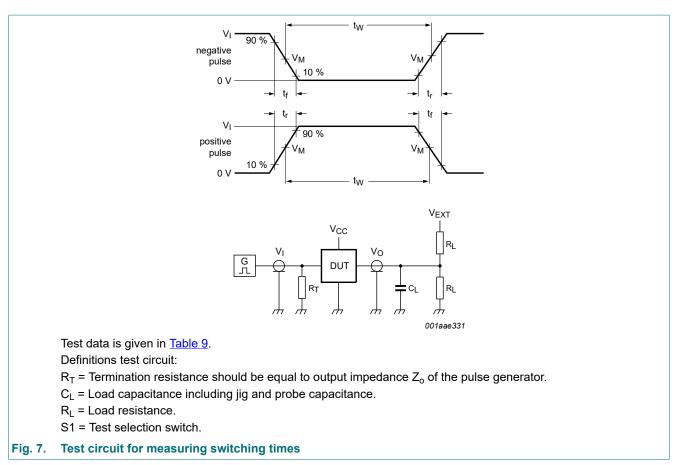


Table 9. Test data

Supply voltage	Input		Load		V _{EXT}		
V _{cc}	VI	t _r , t _f	CL	RL	t _{PHL} , t _{PLH}	t _{PZH} , t _{PHZ}	t _{PZL} , t _{PLZ}
< 2.7 V	V _{CC}	≤ 2.5 ns	50 pF	1 kΩ	open	GND	2V _{CC}
2.7 V to 3.6 V	2.7 V	≤ 2.5 ns	15 pF, 50 pF	1 kΩ	open	GND	2V _{CC}
≥ 4.5 V	V _{CC}	≤ 2.5 ns	50 pF	1 kΩ	open	GND	2V _{CC}

11. Package outline

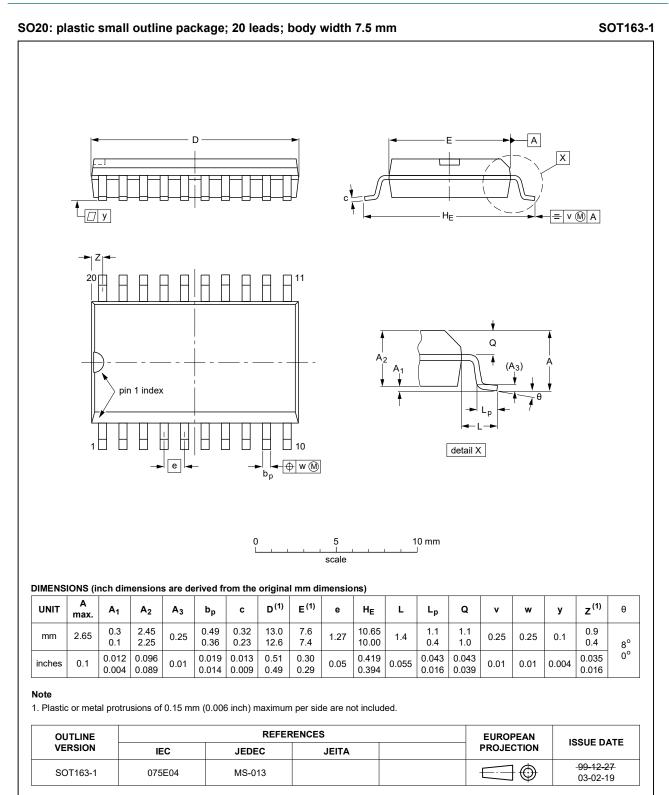


Fig. 8. Package outline SOT163-1 (SO20)

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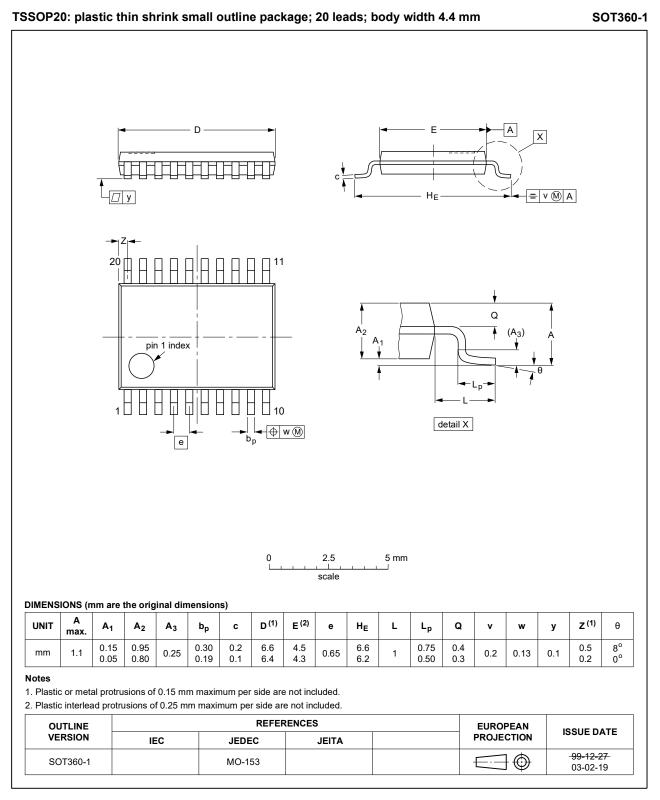


Fig. 9. Package outline SOT360-1 (TSSOP20)

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12. Abbreviations

Table 10. Abbrev	able 10. Abbreviations					
Acronym	Description					
CMOS	Complementary Metal Oxide Semiconductor					
DUT	Device Under Test					
ESD	ElectroStatic Discharge					
НВМ	Human Body Model					
ММ	Machine Model					
TTL	Transistor-Transistor Logic					

13. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes			
74LV244 v.5	20210924	Product data sheet	-	74LV244 v.4			
Modifications:	Nexperia.	h the identity guidelines of e appropriate. d.					
74LV244 v.4	20160301	Product data sheet	-	74LV244 v.3			
Modifications:	Type number	74LV244N (SOT146-1) remov	ed.				
74LV244 v.3	20140311	Product data sheet	-	74LV244 v.2			
Modifications:	guidelines of	 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. 					
74LV244 v.2	19980520	Product specification	-	74LV244 v.1			
74LV244 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.
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