

General Description

The 74HC244 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 that enable the use of current limiting resistors to interface inputs to voltages in excess of V_{CC} .

Features:

- Octal bus interface
- Non-inverting 3-state outputs
- Specified from -40°C to +125°C
- Packaging information: DIP20/SOP20.

Block Diagram And Pin Description

Block Diagram

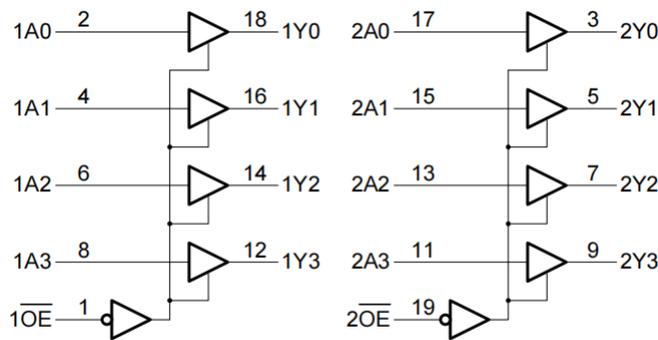


Figure 1. Logic symbol

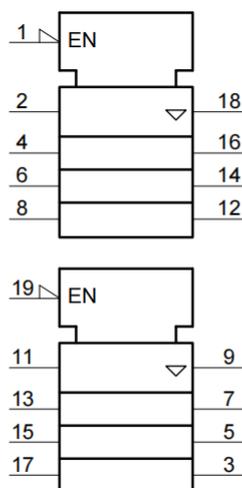


Figure 2. IEC logic symbol

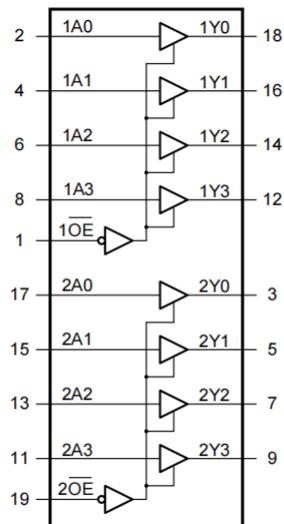
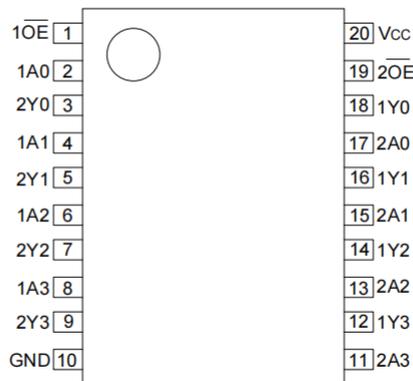


Figure 3. Functional diagram

Pin Configurations



Pin Description

Pin No.	Pin Name	Description
1	1OE	output enable input (active LOW)
2	1A0	data input
3	2Y0	bus output
4	1A1	data input
5	2Y1	bus output
6	1A2	data input
7	2Y2	bus output
8	1A3	data input
9	2Y3	bus output
10	GND	ground (0V)
11	2A3	data input
12	1Y3	bus output
13	2A2	data input
14	1Y2	bus output
15	2A1	data input
16	1Y1	bus output
17	2A0	data input
18	1Y0	bus output
19	2OE	output enable input (active LOW)
20	V _{CC}	supply voltage

Function Table

Input		Output
$\overline{\text{nOE}}$	nAn	nYn
L	L	L
L	H	H
H	X	Z

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

Absolute Maximum Ratings

(Voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V_{CC}	-	-0.5	+7.0	V
input clamping current	I_{IK}	$V_I < -0.5V$ or $V_I > V_{CC}+0.5V$	-	± 20	mA
output clamping current	I_{OK}	$V_O < -0.5V$ or $V_O > V_{CC}+0.5V$	-	± 20	mA
output current	I_O	$-0.5V < V_O < V_{CC}+0.5V$	-	± 35	mA
supply current	I_{CC}	-	-	70	mA
ground current	I_{GND}	-	-70	-	mA
storage temperature	T_{stg}	-	-65	+150	°C
total power dissipation	P_{tot}	-	-	500	mW
Soldering temperature	T_L	10s	DIP	245	°C
			SOP/TSSOP	260	°C

Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
74HC244						
supply voltage	V_{CC}	-	2.0	5.0	6.0	V
input voltage	V_I	-	0	-	V_{CC}	V
output voltage	V_O	-	0	-	V_{CC}	V
input transition rise and fall rate	$\Delta t/\Delta V$	$V_{CC}=2.0V$	-	-	625	ns/V
		$V_{CC}=4.5V$	-	1.67	139	ns/V
		$V_{CC}=6.0V$	-	-	83	ns/V
ambient temperature	T_{amb}	-	-40	-	+125	°C

Electrical Characteristics

DC Characteristics

($T_{amb}=25^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
74HC244							
HIGH-level input voltage	V_{IH}	$V_{CC}=2.0\text{V}$	1.5	1.2	-	V	
		$V_{CC}=4.5\text{V}$	3.15	2.4	-	V	
		$V_{CC}=6.0\text{V}$	4.2	3.2	-	V	
LOW-level input voltage	V_{IL}	$V_{CC}=2.0\text{V}$	-	0.8	0.5	V	
		$V_{CC}=4.5\text{V}$	-	2.1	1.35	V	
		$V_{CC}=6.0\text{V}$	-	2.8	1.8	V	
HIGH-level output voltage	V_{OH}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=-20\mu\text{A}; V_{CC}=2.0\text{V}$	1.9	2.0	-	V
			$I_O=-20\mu\text{A}; V_{CC}=4.5\text{V}$	4.4	4.5	-	V
			$I_O=-20\mu\text{A}; V_{CC}=6.0\text{V}$	5.9	6.0	-	V
			$I_O=-6.0\text{mA}; V_{CC}=4.5\text{V}$	3.98	4.32	-	V
			$I_O=-7.8\text{mA}; V_{CC}=6.0\text{V}$	5.48	5.81	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=20\mu\text{A}; V_{CC}=2.0\text{V}$	-	0	0.1	V
			$I_O=20\mu\text{A}; V_{CC}=4.5\text{V}$	-	0	0.1	V
			$I_O=20\mu\text{A}; V_{CC}=6.0\text{V}$	-	0	0.1	V
			$I_O=6.0\text{mA}; V_{CC}=4.5\text{V}$	-	0.15	0.26	V
			$I_O=7.8\text{mA}; V_{CC}=6.0\text{V}$	-	0.16	0.26	V
input leakage current	I_I	$V_I=V_{CC} \text{ or } \text{GND};$ $V_{CC}=6.0\text{V}$	-	-	± 1.0	μA	
OFF-state output current	I_{OZ}	$V_I=V_{IH} \text{ or } V_{IL}; V_{CC}=6.0\text{V};$ $V_O=V_{CC} \text{ or } \text{GND}$	-	-	± 1.0	μA	
supply current	I_{CC}	$V_I=V_{CC} \text{ or } \text{GND}; I_O=0\text{A}; V_{CC}=6.0\text{V}$	-	-	8.0	μA	
input capacitance	C_I	-	-	3.5	-	pF	

AC Characteristics

(T_{amb}=25°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
74HC244							
nAn to nYn propagation delay	t _{pd}	see Figure 5 ^[1]	V _{CC} =2.0V	-	30	110	ns
			V _{CC} =4.5V	-	11	22	ns
			V _{CC} =5.0V; C _L =15pF	-	9	-	ns
			V _{CC} =6.0V	-	9	19	ns
nOĒ to nYn enable time	t _{en}	see Figure 6 ^[2]	V _{CC} =2.0V	-	36	150	ns
			V _{CC} =4.5V	-	13	30	ns
			V _{CC} =6.0V	-	10	26	ns
nOĒ to nYn disable time	t _{dis}	see Figure 6 ^[3]	V _{CC} =2.0V	-	39	150	ns
			V _{CC} =4.5V	-	14	30	ns
			V _{CC} =6.0V	-	11	26	ns
transition time	t _t	see Figure 5 ^[4]	V _{CC} =2.0V	-	14	60	ns
			V _{CC} =4.5V	-	5	12	ns
			V _{CC} =6.0V	-	4	10	ns
power dissipation capacitance	C _{PD}	per buffer; V _I =GND to V _{CC} ^[5]	-	35	-	pF	

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

[2] t_{en} is the same as t_{PZL} and t_{PZH}.

[3] t_{dis} is the same as t_{PLZ} and t_{PHZ}.

[4] t_t is the same as t_{THL} and t_{TLH}.

[5] C_{PD} is used to determine the dynamic power dissipation (P_D in uW).

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum (C_L \times V_{CC}^2 \times f_o)$$

where:

f_i=input frequency in MHz;

f_o=output frequency in MHz;

C_L=output load capacitance in pF;

V_{CC}=supply voltage in V;

N=number of inputs switching;

∑(C_L×V_{CC}²×f_o)=sum of outputs.

Testing Circuit

AC Testing Circuit

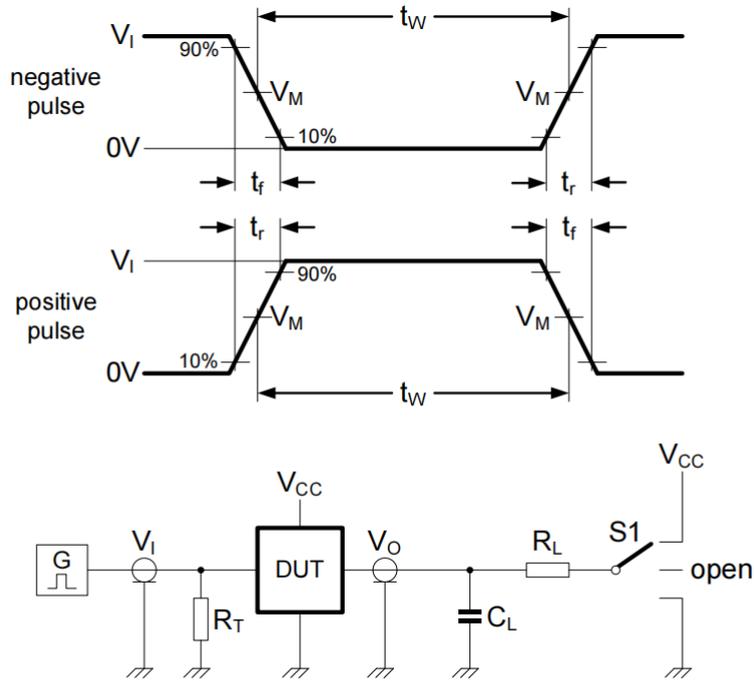


Figure 4. Test circuit for measuring switching times

Definitions for test circuit:

R_L =Load resistance.

C_L =Load capacitance including jig and probe capacitance.

R_T =Termination resistance should be equal to the output impedance Z_o of the pulse generator.

S1=Test selection switch.

AC Testing Waveforms

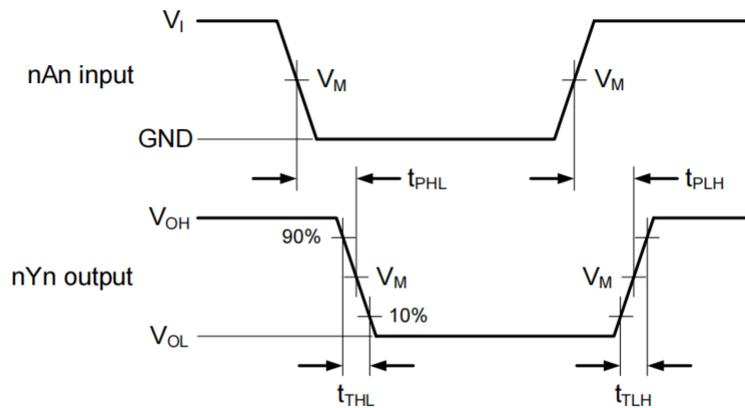


Figure 5. Input (nAn) to output (nYn) propagation delays and output transition times

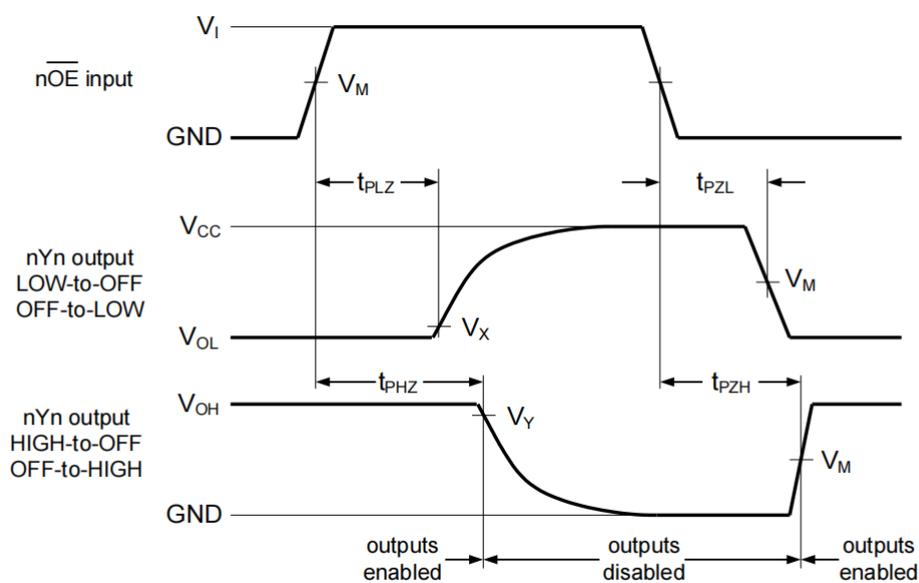


Figure 6. 3-state enable and disable times

Measurement Points

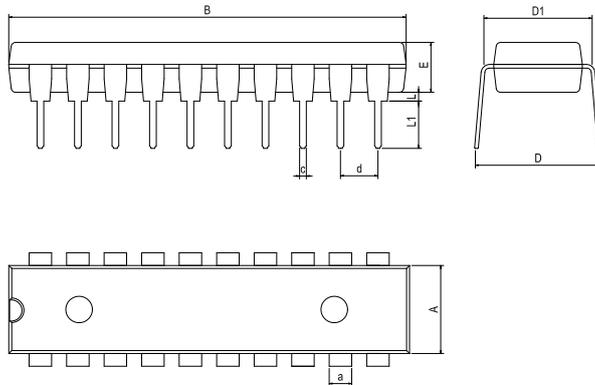
Type	Input		Output	
	V_M	V_M	V_X	V_Y
74HC244	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$0.1 \times V_{CC}$	$0.9 \times V_{CC}$

Test Data

Type	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}
74HC244	V_{CC}	6ns	15pF, 50pF	1k Ω	open	GND	V_{CC}

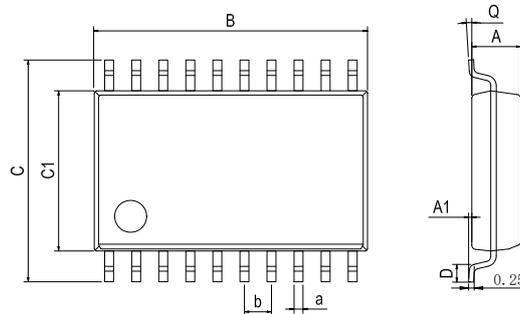
PIN DATA

DIP20



Dimensions In Millimeters(DIP20)										
Symbol:	A	B	D	D1	E	L	L1	a	c	d
Min:	6.10	24.95	8.40	7.42	3.10	0.50	3.00	1.50	0.40	2.54 BSC
Max:	6.68	26.55	9.00	7.82	3.55	0.70	3.60	1.55	0.50	

SOP20



Dimensions In Millimeters(SOP20L)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	2.10	0.05	12.50	10.21	7.40	0.45	0	0.35	1.27 BSC
Max:	2.50	0.25	13.00	10.61	7.60	1.25	8	0.45	