M74LS244P

OCTAL BUFFER/LINE DRIVERS WITH 3-STATE OUTPUTS(NONINVERTED)

DESCRIPTION

The M74LS244P is a semiconductor integrated circuit containing 2 blocks of buffers with 3-state non-inverted output and common output controlling input for all 4 discrete circuits.

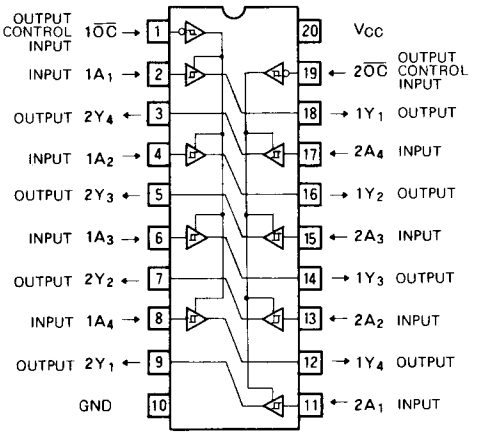
FEATURES

- Low input load factor (pnp input)
- Hysteresis provided (= 400mV typical)
- High breakdown input voltage ($V_I \geqq 15V$)
- Output control input having same phase for 2 circuits
- High fan-out, 3-state output
  (I_{OL} = 24mA, I_{OH} = -15mA)
- Wide operating temperature range (T_a = -20 ~ +75°C)

APPLICATION

General purpose, for use in industrial and consumer equipment.

PIN CONFIGURATION (TOP VIEW)



Outline 20P4

FUNCTIONAL DESCRIPTION

The use of pnp transistors in the input circuit has enabled the achievement of small input load factor. With hysteresis characteristics, the buffer has a 3-state noninverted output with high noise margin.

When output control input $\overline{OC}$ is low, the output Y is low if input A is low and Y is high if A is high. When $\overline{OC}$ is high, all of Y_1, Y_2, Y_3, and Y_4 are in the high-impedance state, irrespective of the status of A.

By connecting $1\overline{OC}$ with $2\overline{OC}$, it becomes possible to control the output of all 8 circuits simultaneously. Output can be terminated by a load resistor of 133Ω or over.

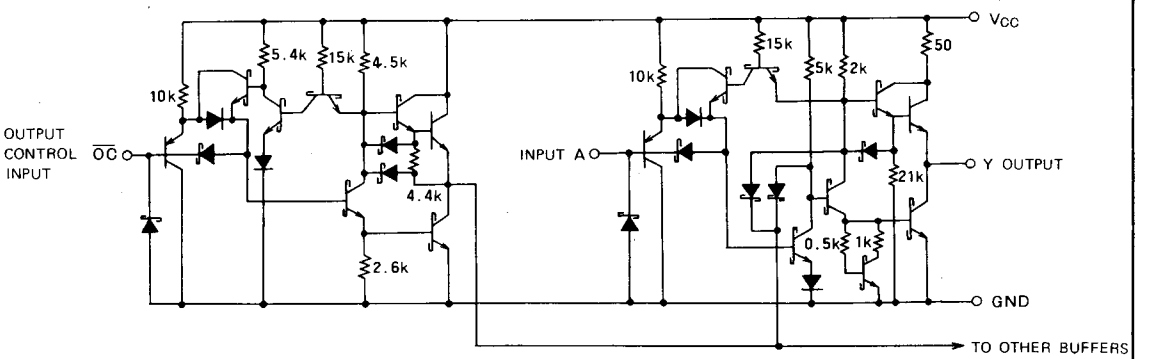
For standard characteristics, see M74LS241P.

FUNCTION TABLE (Note 1)

A	$\overline{OC}$	Y
L	L	L
H	L	H
X	H	Z

Note 1: Z : high-impedance
X : irrelevant

CIRCUIT DIAGRAM (EACH BUFFER)



UNIT: Ω

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ABSOLUTE MAXIMUM RATINGS (Ta = −20 ~ +75°C, unless otherwise noted)

Symbol	Parameter	Conditions	Limits	Unit
V_{CC}	Supply voltage		−0.5 ~ +7	V
V_I	Input voltage		−0.5 ~ +15	V
V_O	Output voltage	Off-state	−0.5 ~ +5.5	V
Topr	Operating free-air ambient temperature range		−20 ~ +75	°C
Tstg	Storage temperature range		−65 ~ +150	°C

RECOMMENDED OPERATING CONDITIONS (Ta = −20 ~ +75°C, unless otherwise noted)

Symbol	Parameter		Limits			Unit
			Min	Typ	Max	
V_{CC}	Supply voltage		4.75	5	5.25	V
I_{OH}	High-level output current	$V_{OH} \geqq 2.4V$			−3	mA
		$V_{OH} \geqq 2V$			−15	mA
I_{OL}	Low-level output current	$V_{OL} \leqq 0.4V$			12	mA
		$V_{OL} \leqq 0.5V$			24	mA

ELECTRICAL CHARACTERISTICS (Ta = −20 ~ +75°C, unless otherwise noted)

Symbol	Parameter	Test conditions		Limits			Unit
				Min	Typ*	Max	
V_{IH}	High-level input voltage			2			V
V_{IL}	Low-level input voltage					0.8	V
$V_{T+} - V_{T-}$	Hysteresis	V_{CC}=4.75V		0.2	0.4		V
V_{IC}	Input clamp voltage	V_{CC}=4.75V, I_{IC}=−18mA				−1.5	V
V_{OH}	High-level output voltage	V_{CC}=4.75V, V_I=2V	V_I=0.8V, I_{OH}=−3mA	2.4	3.4		V
			V_I=0.5V, I_{OH}=−15mA	2			V
V_{OL}	Low-level output voltage	V_{CC}=4.75V, V_I=0.8V, V_I=2V	I_{OL}=12mA		0.25	0.4	V
			I_{OL}=24mA		0.35	0.5	V
I_{OZH}	Off-state high-level output current	V_{CC}=5.25V, V_I=2V, V_O=2.7V				20	μA
I_{OZL}	Off-state low-level output current	V_{CC}=5.25V, V_I=2V, V_O=0.4V				−20	μA
I_{IH}	High-level input current	V_{CC}=5.25V, V_I=2.7V				20	μA
		V_{CC}=5.25V, V_I=10V				0.1	mA
I_{IL}	Low-level input current	V_{CC}=5.25V, V_I=0.4V				−0.2	mA
I_{OS}	Short-circuit output current (Note 2)	V_{CC}=5.25V, V_O=0V		−40		−225	mA
I_{CCH}	Supply current, all outputs high	V_{CC}=5.25V, V_I=0V, V_I=4.5V			17	27	mA
I_{CCL}	Supply current, all outputs low	V_{CC}=5.25V, V_I=0V			27	46	mA
I_{CCZ}	Supply current, all outputs off	V_{CC}=5.25V, V_I=4.5V			32	54	mA

* : All typical values are at V_{CC} = 5V, Ta = 25°C.
Note 2: All measurements should be done quickly, and not more than one output should be shorted at a time.

SWITCHING CHARACTERISTICS (V_{CC}=5V, Ta = 25°C, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
t_{PLH}	Low-to-high-level, high-to-low-level output propagation time, from input A to output Y	C_L=45pF (Note 3)		8	18	ns
t_{PHL}				9	18	ns
t_{PZH}	Output enable time to high-level	R_L=667Ω, C_L=45pF (Note 3)		15	30	ns
t_{PZL}	Output enable time to low-level	R_L=667Ω, C_L=45pF (Note 3)		12	40	ns
t_{PLZ}	Output disable time from low-level	R_L=667Ω, C_L= 5 pF (Note 3)		11	25	ns
t_{PHZ}	Output disable time from high-level	R_L=667Ω, C_L= 5 pF (Note 3)		12	18	ns

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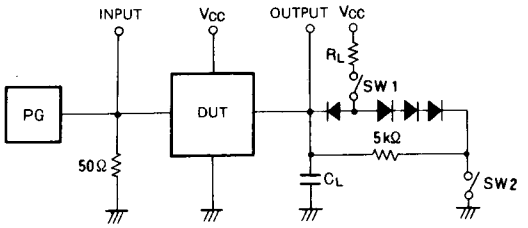
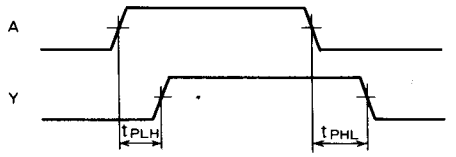
Note 3: Measurement circuit

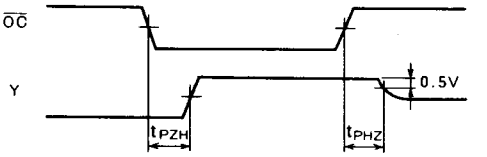


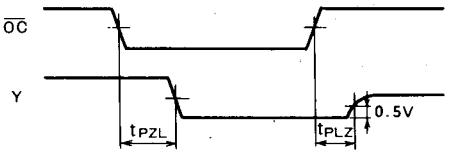
Symbol	SW 1	SW2
t_{PZH}	Open	Closed
t_{PZL}	Closed	Open
t_{PLZ}	Closed	Closed
t_{PHZ}	Closed	Closed

(1) The pulse generator (PG) has the following characteristics: PRR = 1MHz, t_r = 6ns, t_f = 6ns, t_W = 500ns, V_P = 3V_{P-P}, Z_O = 50Ω
(2) All diodes are switching diodes ($t_{rr} \leqq$ 4ns)
(3) C_L includes probe and jig capacitance.

TIMING DIAGRAM (Reference level = 1.3V)

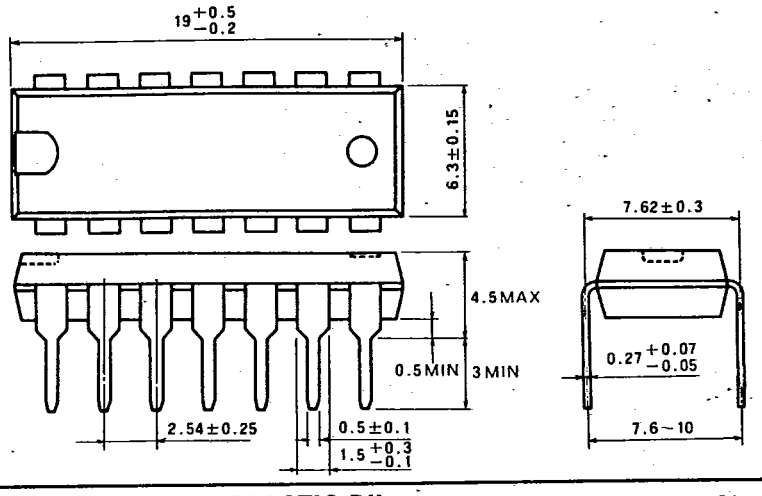






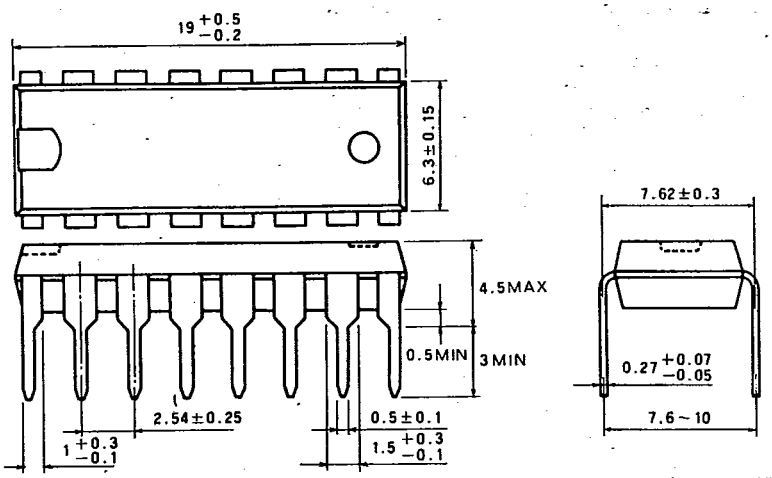
TYPE 14P4 14-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 16P4 16-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 20P4 20-PIN MOLDED PLASTIC DIL

Dimension in mm