

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 ($V_1 \geq 15V$)
- 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 ($T_a = -20 \sim +75^\circ C$)

APPLICATION

General purpose, for use in industrial and consumer equipment.

FUNCTIONAL DESCRIPTION

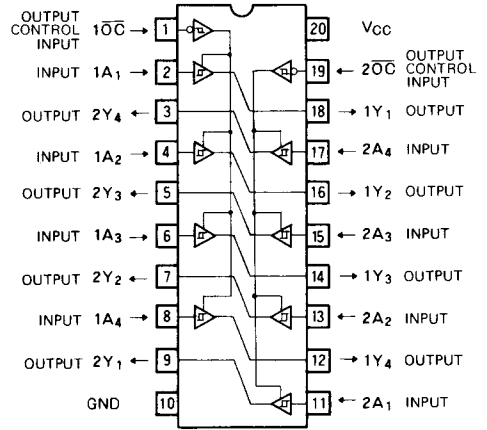
The use of pnp transistors in the input circuit has enabled the achievement of small input load factor. With hysteresis characteristics, the buffer has a 3-state noninverted output with high noise margin.

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.

PIN CONFIGURATION (TOP VIEW)



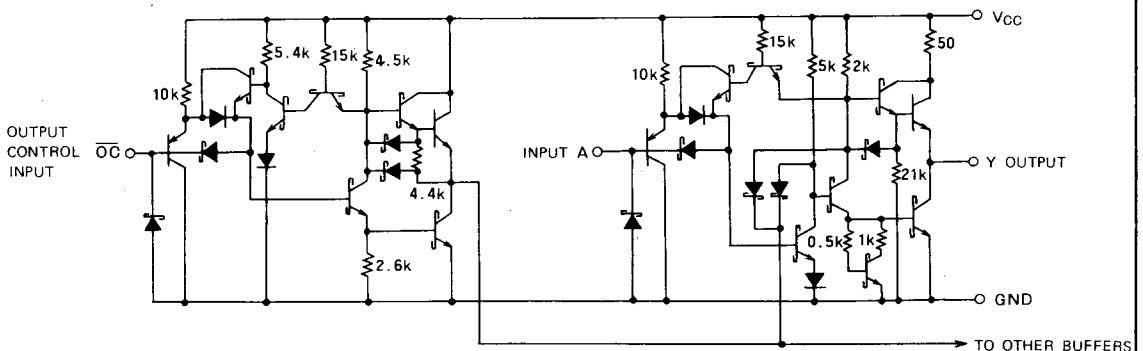
Outline 20P4

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 ($T_a = -20 \sim +75^\circ\text{C}$, 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
T_{opr}	Operating free-air ambient temperature range		-20 ~ +75	$^\circ\text{C}$
T_{stg}	Storage temperature range		-65 ~ +150	$^\circ\text{C}$

RECOMMENDED OPERATING CONDITIONS ($T_a = -20 \sim +75^\circ\text{C}$, 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	$V_{OH} \geq 2.4\text{V}$		-3	mA
		$V_{OH} \geq 2\text{V}$		-15	mA
I_{OL}	Low-level output current	$V_{OL} \leq 0.4\text{V}$		12	mA
		$V_{OL} \leq 0.5\text{V}$		24	mA

ELECTRICAL CHARACTERISTICS ($T_a = -20 \sim +75^\circ\text{C}$, 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	$V_{CC} = 4.75\text{V}$	0.2	0.4		V
V_{IC}	Input clamp voltage	$V_{CC} = 4.75\text{V}$, $I_{IC} = -18\text{mA}$			-1.5	V
V_{OH}	High-level output voltage	$V_{CC} = 4.75\text{V}$, $V_I = 2\text{V}$, $I_{OH} = -3\text{mA}$	2.4	3.4		V
		$V_I = 0.8\text{V}$, $I_{OH} = -3\text{mA}$ $V_I = 0.5\text{V}$, $I_{OH} = -15\text{mA}$	2			V
V_{OL}	Low-level output voltage	$V_{CC} = 4.75\text{V}$, $I_{OL} = 12\text{mA}$		0.25	0.4	V
		$V_I = 0.8\text{V}$, $V_I = 2\text{V}$, $I_{OL} = 24\text{mA}$		0.35	0.5	V
I_{OZH}	Off-state high-level output current	$V_{CC} = 5.25\text{V}$, $V_I = 2\text{V}$, $V_O = 2.7\text{V}$			20	μA
I_{OZL}	Off-state low-level output current	$V_{CC} = 5.25\text{V}$, $V_I = 2\text{V}$, $V_O = 0.4\text{V}$			-20	μA
I_{IH}	High-level input current	$V_{CC} = 5.25\text{V}$, $V_I = 2.7\text{V}$			20	μA
		$V_{CC} = 5.25\text{V}$, $V_I = 10\text{V}$			0.1	mA
I_{IL}	Low-level input current	$V_{CC} = 5.25\text{V}$, $V_I = 0.4\text{V}$			-0.2	mA
I_{OS}	Short-circuit output current (Note 2)	$V_{CC} = 5.25\text{V}$, $V_O = 0\text{V}$	-40		-225	mA
I_{CCH}	Supply current, all outputs high	$V_{CC} = 5.25\text{V}$, $V_I = 0\text{V}$, $V_O = 4.5\text{V}$		17	27	mA
I_{CCL}	Supply current, all outputs low	$V_{CC} = 5.25\text{V}$, $V_I = 0\text{V}$		27	46	mA
I_{CCZ}	Supply current, all outputs off	$V_{CC} = 5.25\text{V}$, $V_I = 4.5\text{V}$		32	54	mA

* : All typical values are at $V_{CC} = 5\text{V}$, $T_a = 25^\circ\text{C}$.

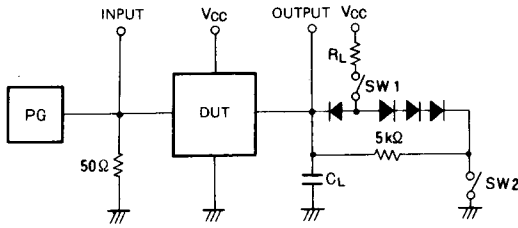
Note 2: All measurements should be done quickly, and not more than one output should be shorted at a time.

SWITCHING CHARACTERISTICS ($V_{CC} = 5\text{V}$, $T_a = 25^\circ\text{C}$, 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	$C_L = 45\text{pF}$ (Note 3)		8	18	ns
t_{PHL}				9	18	ns
t_{PZH}	Output enable time to high-level	$R_L = 667\Omega$, $C_L = 45\text{pF}$ (Note 3)		15	30	ns
t_{PZL}	Output enable time to low-level	$R_L = 667\Omega$, $C_L = 45\text{pF}$ (Note 3)		12	40	ns
t_{PLZ}	Output disable time from low-level	$R_L = 667\Omega$, $C_L = 5\text{pF}$ (Note 3)		11	25	ns
t_{PHZ}	Output disable time from high-level	$R_L = 667\Omega$, $C_L = 5\text{pF}$ (Note 3)		12	18	ns

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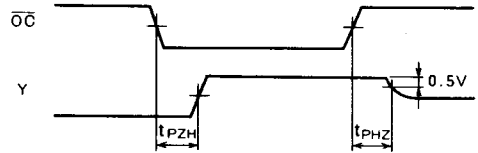
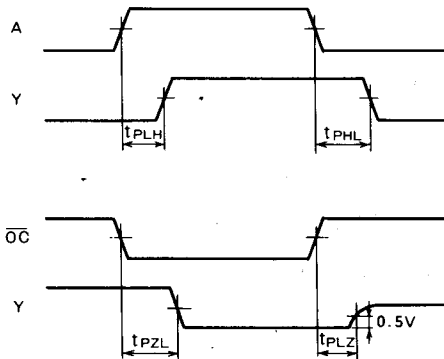
Note 3: Measurement circuit



Symbol	SW 1	SW 2
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, $t_r = 6ns$, $t_f = 6ns$, $t_w = 500ns$,
 $V_p = 3V_{p-p}$, $Z_o = 50\Omega$
- (2) All diodes are switching diodes ($t_{rr} \leq 4ns$)
- (3) C_L includes probe and jig capacitance.

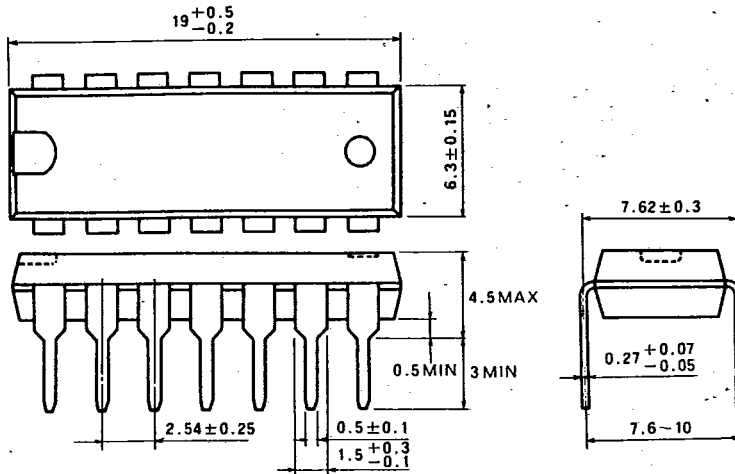
TIMING DIAGRAM (Reference level = 1.3V)



T-90-20

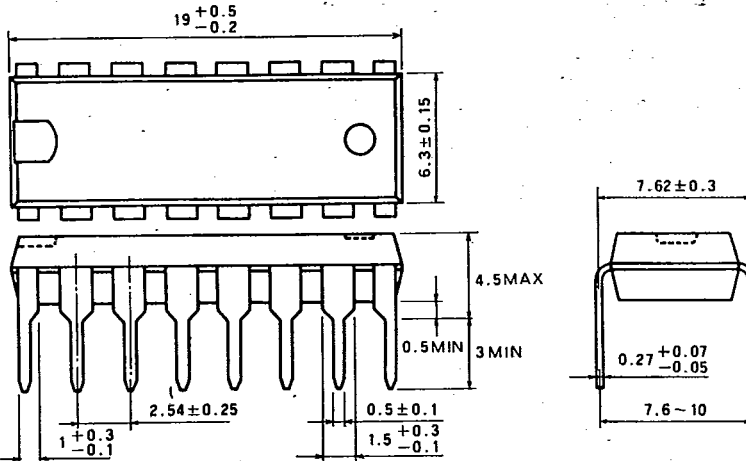
TYPE 14P4 14-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 16P4 16-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 20P4 20-PIN MOLDED PLASTIC DIL

Dimension in mm

