M74LS245P

OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS(NONINVERTED)

DESCRIPTION

The M74LS245P is a semiconductor integrated circuit containing of 8 bus transmitter/receiver circuits with non-inverted outputs.

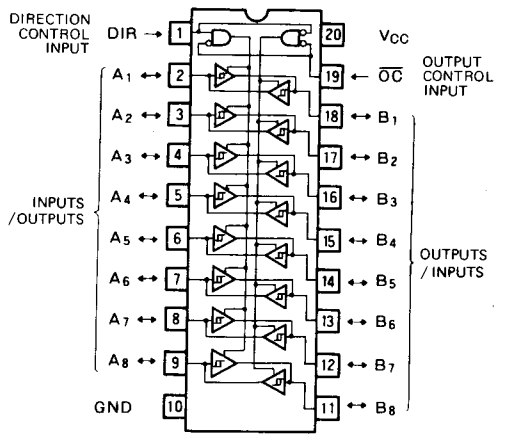
FEATURES

- Bi-directional transmission or separation of two 8 bit data is possible.
- Low input load factor (pnp input)
- Input/output A and output/input B have hysteresis characteristics (Hysteresis = 400mV typical)
- High fan-out (I_{OL} = 24mA, I_{OH} = -15mA)
- Wide operating temperature range. (T_a = -20 ~ +75°C)

APPLICATION

General digital equipment for industrial and consumer use

PIN CONFIGURATION (TOP VIEW)



Outline 20P4

FUNCTIONAL DESCRIPTION

The inputs and outputs of the two buffer circuits with 3-state non-inverted outputs are connected alternately to form a bi-directional buffer.

With hysterisis characteristics in the input section of input/output A and output/input B, noise margin is high. The use of a pnp transistor input has made the input load factor small. The data direction control input DIR controls the direction of input and output. When DIR is high, A is the input terminal and B is the output terminal. On the contrary, when DIR is low, B is the input terminal and A is the output terminal.

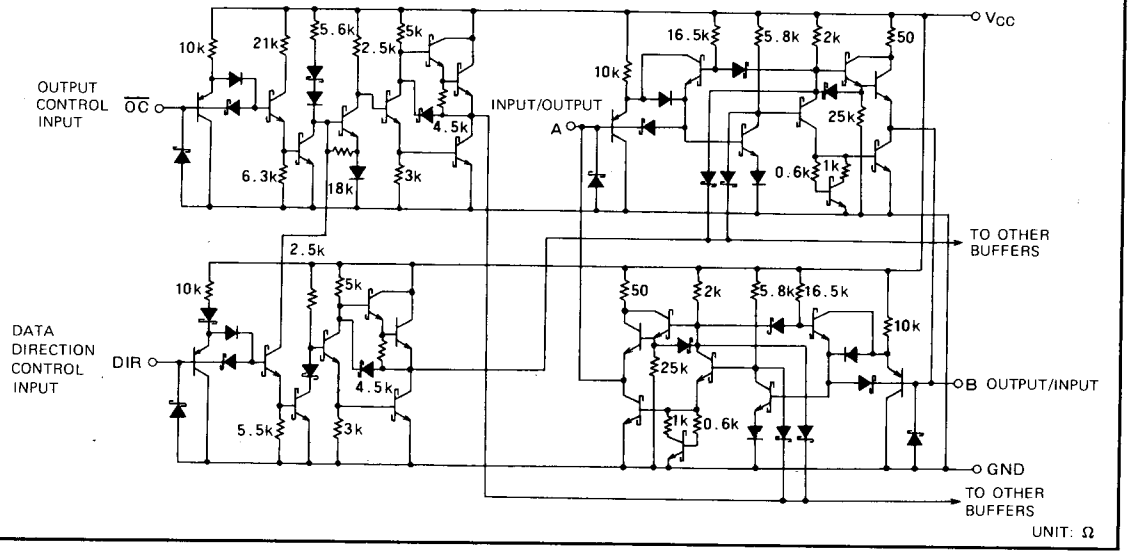
When the output control input $\overline{OC}$ is high, both A and B, in a high-impedance state, are separated.

FUNCTION TABLE (Note 1)

$\overline{OC}$	DIR	A	B
L	L	O	I
L	H	I	O
H	X	Z	Z

Note 1: I : input
O : output (noninverted output)
Z : high-impedance
X : irrelevant

CIRCUIT DIAGRAM (EACH BUFFER)



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OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS(NONINVERTED)

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

Symbol	Parameter		Conditions	Limits	Unit
V_{CC}	Supply voltage			−0.5 ~ +7	V
V_I	Input voltage	A, B		−0.5 ~ +5.5	V
		DIR, $\overline{OC}$		−0.5 ~ +15	V
V_O	Output voltage		Off-state	−0.5 ~ +5.5	V
Topr	Operating free-air ambient temperature range			−20 ~ +75	℃
Tstg	Storage temperature range			−65 ~ +150	℃

RECOMMENDED OPERATING CONDITIONS (Ta = −20 ~ +75℃, 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	$V_{OH} \geq 2.4V$	0		−3	mA
		$V_{OH} \geq 2V$	0		−15	mA
I_{OL}	Low-level output current	$V_{OL} \leq 0.4V$	0		12	mA
		$V_{OL} \leq 0.5V$	0		24	mA

ELECTRICAL CHARACTERISTICS (Ta = −20 ~ +75℃, 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
$V_{T+} - V_{T-}$	Hystersis		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	I_{OH} = −3mA	2.4	3.4		V
			V_I = 0.8V, V_I = 2V	I_{OH} = −15mA	2			V
V_{OL}	Low-level output voltage		V_{CC} = 4.75V	I_{OL} = 12mA			0.4	V
			V_I = 0.8V, V_I = 2V	I_{OL} = 24mA			0.5	V
I_{OZH}	Off-state high-level output current		V_{CC} = 5.25V, V_I = 0.8V, V_I = 2V, V_O = 2.7V				20	μA
I_{OZL}	Off-state low-level output current		V_{CC} = 5.25V, V_I = 0.8V, V_I = 2V, V_O = 0.4V				−200	μA
I_{IH}	High-level input current	A, B	V_{CC} = 5.25V, V_I = 2.7V				20	μA
		DIR, $\overline{OC}$					20	μA
		A, B	V_{CC} = 5.25V, V_I = 5.5V				0.1	mA
		DIR, $\overline{OC}$	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			48	70	mA
I_{CCL}	Supply current, all outputs low		V_{CC} = 5.25V, V_I = 0V, V_I = 4.5V			62	90	mA
I_{CCZ}	Supply current, all outputs off		V_{CC} = 5.25V, V_I = 0V, V_I = 4.5V			64	95	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℃ 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, B to output B, A	C_L = 45pF (Note 3)		10	15	ns
t_{PHL}				10	15	ns
t_{PZL}	Output enable time to low-level	R_L = 667Ω, C_L = 45pF (Note 3)		25	40	ns
t_{PZH}	Output enable time to high-level	R_L = 667Ω, C_L = 45pF (Note 3)		23	40	ns
t_{PLZ}	Output disable time from low-level	R_L = 667Ω, C_L = 5pF (Note 3)		15	25	ns
t_{PHZ}	Output disable time from high-level	R_L = 667Ω, C_L = 5pF (Note 3)		14	25	ns

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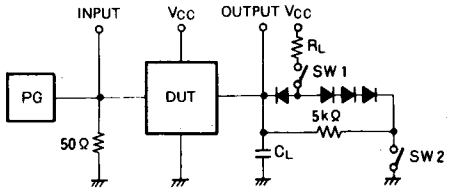
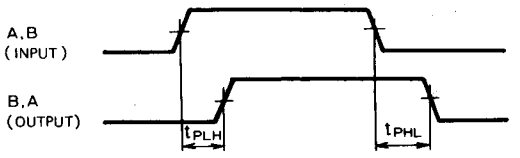
Note 3: Measurement circuit

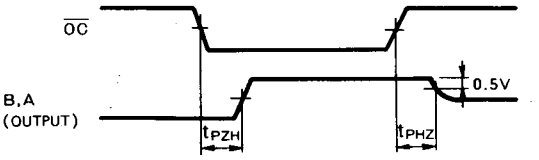


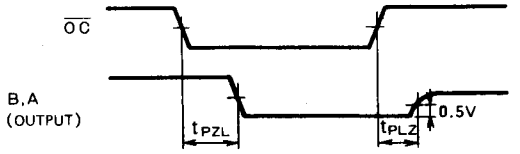
Symbol	SW 1	SW2
t_{PZH}	Open	Closed
t_{PZL}	Closed	Open
t_{PLZ}	Closed	Closed
t_{PHZ}	Closed	Closed

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

TIMING DIAGRAM (Reference level = 1.3V)

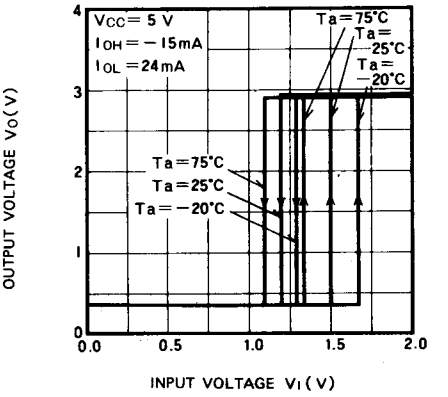




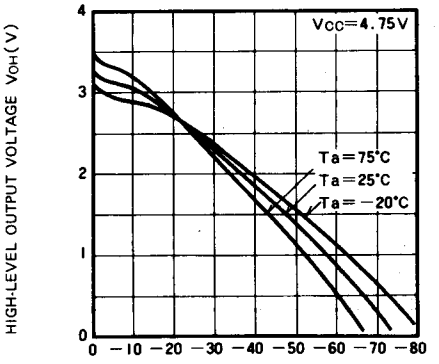


TYPICAL CHARACTERISTICS

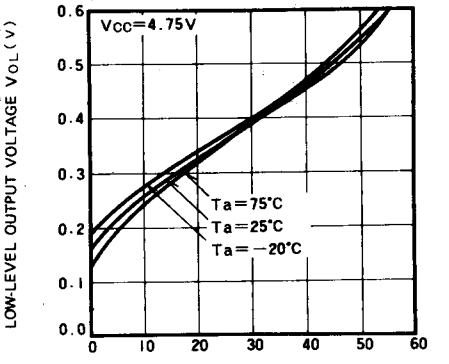
OUTPUT VOLTAGE VS INPUT VOLTAGE



HIGH-LEVEL OUTPUT VOLTAGE VS HIGH-LEVEL OUTPUT CURRENT



LOW-LEVEL OUTPUT VOLTAGE VS LOW-LEVEL OUTPUT CURRENT



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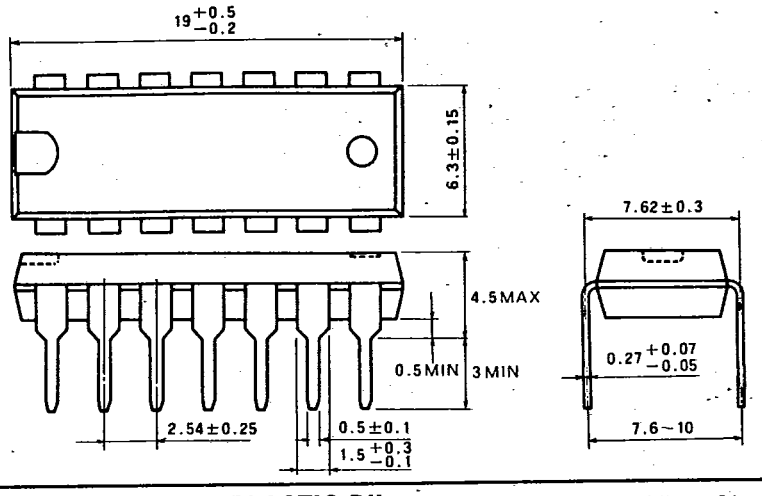
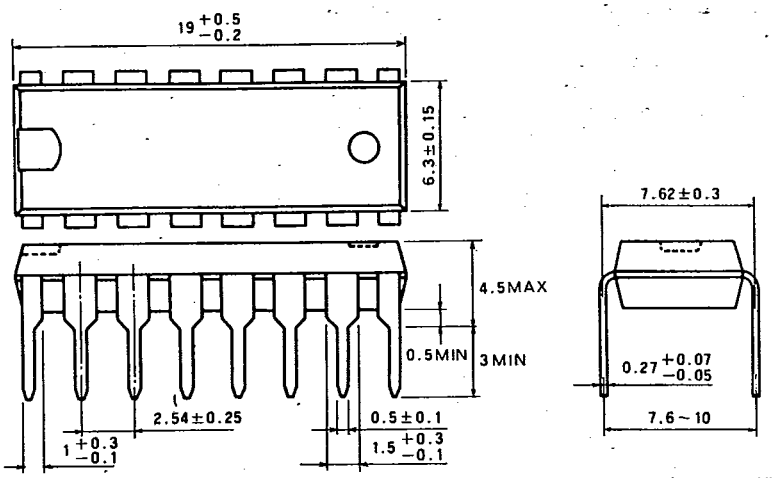
TYPE 14P4 14-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 16P4 16-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 20P4 20-PIN MOLDED PLASTIC DIL

Dimension in mm