74ALS240A, 74ALS240A-1
Buffer

Octal Inverter Buffer (3-State)

Product Specification

FEATURES

- **Octal bus interface**
- **3-State buffer outputs sink 24mA and source 15mA**
- **The -1 version sinks 48mA I_{OL} within the ±5% V_{CC} range**

DESCRIPTION

The 74ALS240A is an octal buffer that is ideal for driving bus lines or buffer memory address registers. The outputs are all capable of sinking 24mA and sourcing up to 15mA, producing very good capacitive drive characteristics. The device features two Output Enables, $\overline{OE}_a$ and $\overline{OE}_b$, each controlling four of the 3-state outputs. The 74ALS240A-1 sinks 48mA if the V_{CC} is limited to 5.0V ± 0.25V.

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74ALS240A	4.5ns	15mA
74ALS240A-1	4.5ns	15mA

ORDERING INFORMATION

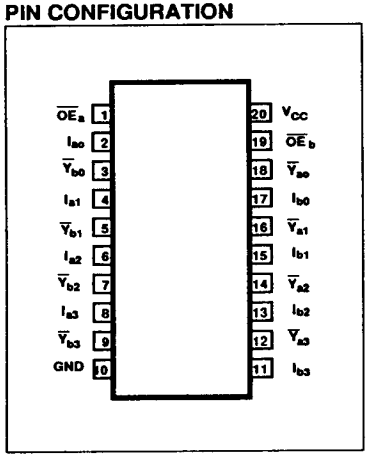
PACKAGES	COMMERCIAL RANGE V_{CC} = 5V±10%; T_A = 0°C to +70°C
20-Pin Plastic DIP	74ALS240AN, 74ALS240A-1N
20-Pin Plastic SOL	74ALS240AD, 74ALS240A-1D

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

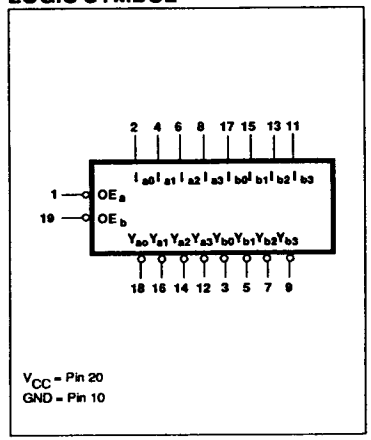
PINS	DESCRIPTION	74F(U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
I_{an}, I_{bn}	Data inputs	1.0/1.0	20µA/0.1mA
$\overline{OE}_a$, $\overline{OE}_b$	Output enable inputs (active Low)	1.0/1.0	20µA/0.1mA
$\overline{Y}_{an}$, $\overline{Y}_{bn}$	Data outputs	750/240	15mA/24mA
$\overline{Y}_{an}$, $\overline{Y}_{bn}$	Data outputs (-1 version)	750/480	15mA/48mA

NOTE:
One (1.0) ALS Unit Load is defined as: 20µA in the High state and 0.1mA in the Low state.

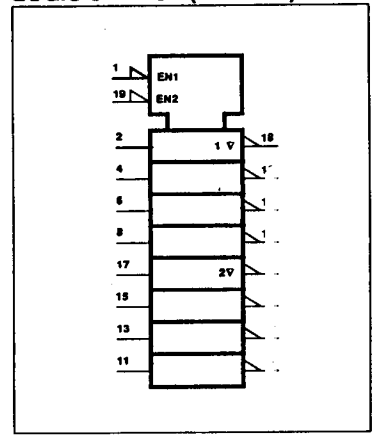
PIN CONFIGURATION



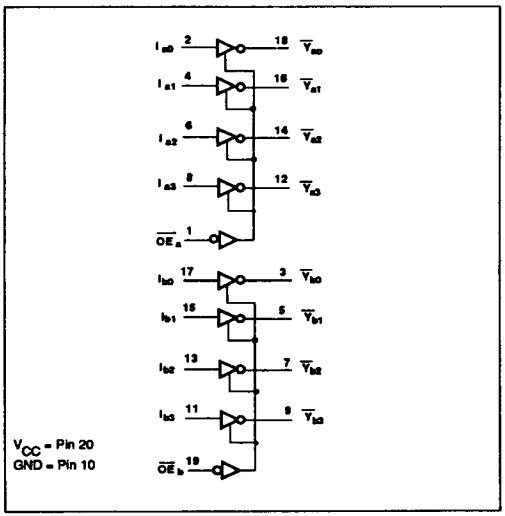
LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



LOGIC DIAGRAM



FUNCTION TABLE

INPUTS				OUTPUTS	
$\overline{OE}_a$	I_a	$\overline{OE}_b$	I_b	$\overline{Y}_a$	$\overline{Y}_b$
L	L	L	L	H	H
L	H	L	H	L	L
H	X	H	X	Z	Z

H = High voltage level
L = Low voltage level
X = Don't care
Z = High impedance "off" state

ABSOLUTE MAXIMUM RATINGS

(Operation beyond the limits set forth in this table may impair the useful life of the device. Unless otherwise noted these limits are over the operating free-air temperature range.)

SYMBOL	PARAMETER		RATING	UNIT
V_{CC}	Supply voltage		-0.5 to +7.0	V
V_{IN}	Input voltage		-0.5 to +7.0	V
I_{IN}	Input current		-30 to +5	mA
V_{OUT}	Voltage applied to output in High output state		-0.5 to +V_{CC}	V
I_{OUT}	Current applied to output in Low output state	All versions	48	mA
I_{OUT}	Current applied to output in Low output state	-1 version only	96	mA
T_A	Operating free-air temperature range		0 to +70	°C
T_{STG}	Storage temperature		-65 to +150	°C

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER		LIMITS			UNIT
			Min	Nom	Max	
V_{CC}	Supply voltage		4.5	5.0	5.5	V
V_{IH}	High-level input voltage		2.0			V
V_{IL}	Low-level input voltage				0.8	V
I_{IK}	Input clamp current				-18	mA
I_{OH}	High-level output current				-15	mA
I_{OL}	Low-level output current	All versions			24	mA
I_{OL}	Low-level output current	-1 version only			48[1]	mA
T_A	Operating free-air temperature range		0		70	°C

NOTE:
1. The 48mA limit applies only under the condition of V_{CC} = 5.0V ± 5%.

DC ELECTRICAL CHARACTERISTICS (Over recommended operating free-air temperature range unless otherwise noted.)

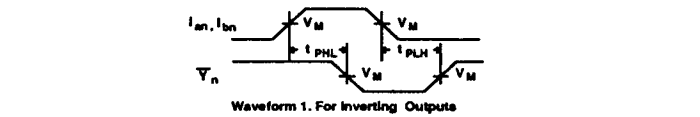
SYMBOL	PARAMETER		TEST CONDITIONS[1]			LIMITS Min	LIMITS Typ[2]	LIMITS Max	UNIT
V_{OH}	High-level output voltage		V_{CC} ± 10%	V_{IL} = MAX, V_{IH} = MIN	I_{OH} = -0.4mA	V_{CC} -2			V
			V_{CC} = MIN		I_{OH} = -3mA	2.4	3.2		V
					I_{OH} = -15mA	2.0			V
V_{OL}	Low-level output voltage	All versions	V_{CC} = MIN	V_{IL} = MAX, V_{IH} = MIN	I_{OL} = 12mA		0.25	0.4	V
					I_{OL} = 24mA		0.35	0.5	V
		-1 version	V_{CC} = 4.75V		I_{OL} = 48mA		0.35	0.5	V
V_{IK}	Input clamp voltage		V_{CC} = MIN, I_I = I_{IK}				-0.73	-1.5	V
I_I	Input current at maximum input voltage		V_{CC} = MAX, V_I = 7.0V					0.1	mA
I_{IH}	High-level input current		V_{CC} = MAX, V_I = 2.7V					20	µA
I_{IL}	Low-level input current		V_{CC} = MAX, V_I = 0.4V					-0.1	mA
I_{OZH}	Off-state output current High-level voltage applied		V_{CC} = MAX, V_O= 2.7V					20	µA
I_{OZL}	Off-state output current Low-level voltage applied		V_{CC} = MAX, V_O= 0.4V					-20	µA
I_O	Short-circuit output current[3]		V_{CC} = MAX, V_O= 2.25V			-30		-112	mA
I_{CC}	Supply current (total)	I_{CCH}	V_{CC} = MAX				2.5	11	mA
		I_{CCL}					19.5	23	mA
		I_{CCZ}					23	30	mA

NOTES:
1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
2. All typical values are at V_{CC} = 5V, T_A = 25°C.
3. The output conditions have been chosen to produce current that closely approximates one half of the true short-circuit output current, I_{OS}.

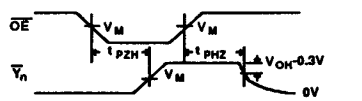
AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS T_A = 0°C to +70°C, V_{CC} = 5V ±10%, C_L = 50pF, R_L = 500Ω		UNIT
			Min	Max	
t_{PLH} t_{PHL}	Propagation delay I_n to $\overline{Y}_n$	Waveform 1	2.0 2.0	9.0 9.0	ns ns
t_{PZH} t_{PZL}	Output Enable time to High or Low level	Waveform 2 Waveform 3	2.0 3.0	10.0 12.0	ns ns
t_{PHZ} t_{PLZ}	Output Disable time to High or Low level	Waveform 2 Waveform 3	2.0 3.0	10.0 12.0	ns ns

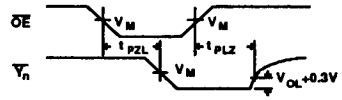
AC WAVEFORMS



Waveform 1. For Inverting Outputs



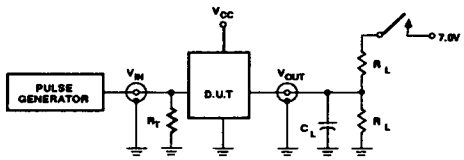
Waveform 2. 3-State Output Enable Time To High Level And Output Disable Time From High Level



Waveform 3. 3-State Output Enable Time To Low Level And Output Disable Time From Low Level

NOTE: For all waveforms, V_M = 1.3V.

TEST CIRCUIT AND WAVEFORMS



Test Circuit For 3-State Outputs

SWITCH POSITION

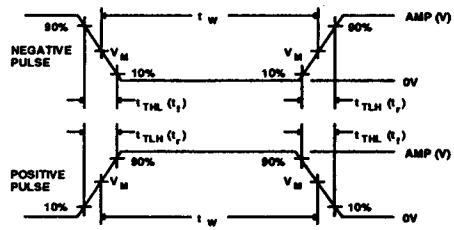
TEST	SWITCH
t_{PLZ}	closed
t_{PZL}	closed
All other	open

DEFINITIONS

R_L = Load resistor; see AC CHARACTERISTICS for value.

C_L = Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.

R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.



V_M = 1.3V

Input Pulse Definition

FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	t_W	t_{TLH}	t_{THL}
74ALS	3.5V	1MHz	500ns	2.0ns	2.0ns