BUFFERS/DRIVERS   54/74365A, 366A, 367A, 368A, LS365A, LS366A, LS367A, LS368A

'365A, '367A Hex Buffer/Driver (3-State)
'366A, '368A Hex Inverter Buffer (3-State)

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (Total)
74365A, 367A	10ns	65mA
74LS365A, 367A	10ns	14mA
74366A, 368A	9ns	59mA
74LS366A, 368A	10ns	12mA

ORDERING CODE

PACKAGES	COMMERCIAL RANGES $V_{CC} = 5V \pm 5\%$; $T_A = 0°C$ to $+70°C$	MILITARY RANGES $V_{CC} = 5V \pm 10\%$; $T_A = -55°C$ to $+125°C$
Plastic DIP	N74365AN • N74LS365AN N74366AN • N74LS366AN N74367AN • N74LS367AN N74368AN • N74LS368AN	
Plastic SO	N74LS365AD • N74LS367AD N74LS368AD	
Ceramic DIP		S54365AF • S54LS365AF S54366AF • S54LS366AF S54367AF • S54LS367AF S54368AF • S54LS368AF
Flatpack		S54365AW • S54LS365AW S54366AW • S54LS366AW S54367AW • S54LS367AW S54368AW • S54LS368AW
LLCC		S54LS365AG S54LS367AG

FUNCTION TABLE, '365A, '366A

INPUTS			OUTPUTS	
$\overline{OE}_1$	$\overline{OE}_2$	I	Y	$\overline{Y}$
L	L	L	L	H
L	L	H	H	L
X	H	X	(Z)	(Z)
H	X	X	(Z)	(Z)

FUNCTION TABLE, '367A, '368A

INPUTS		OUTPUTS	
$\overline{OE}$	I	Y	$\overline{Y}$
L	L	L	H
L	H	H	L
H	X	(Z)	(Z)

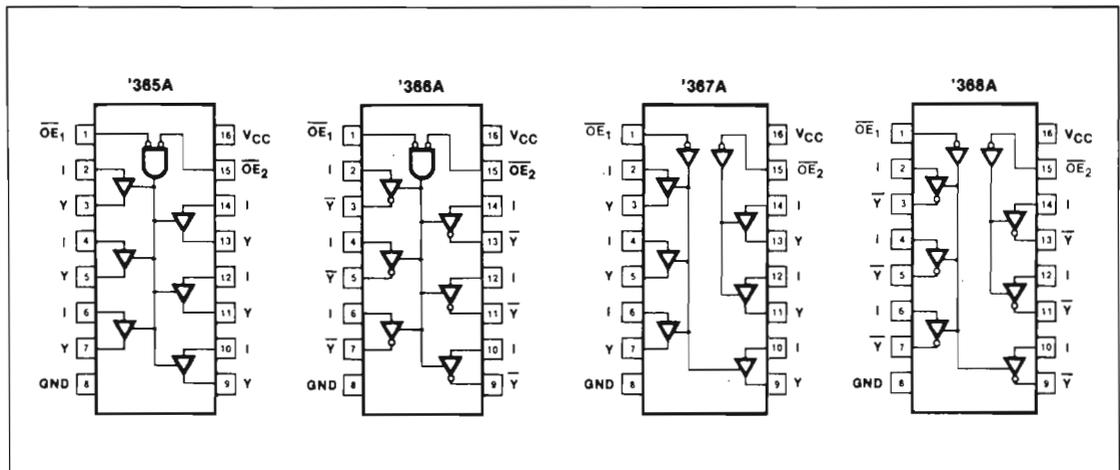L = LOW voltage level
H = HIGH voltage level
X = Don't care
(Z) = HIGH impedance (off) state

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION	54/74	54/74LS
All	Inputs	1ul	1LSul
All	Outputs	20ul	30LSul

NOTE
Where a 54/74 unit load (ul) is understood to be 40μA I_{IH} and $-1.6mA$ I_{IL} and a 54/74LS unit load (LSul) is 20μA I_{IH} and $-0.4mA$ I_{IL}
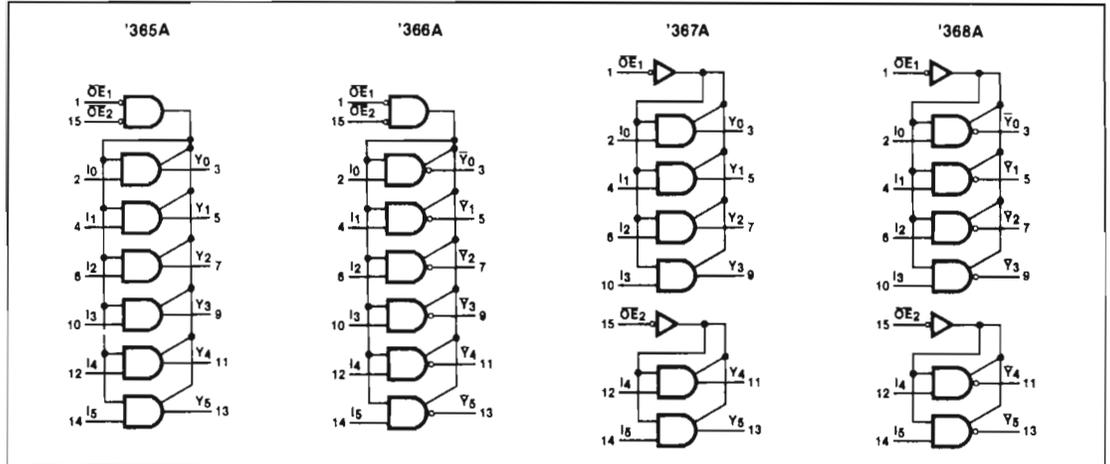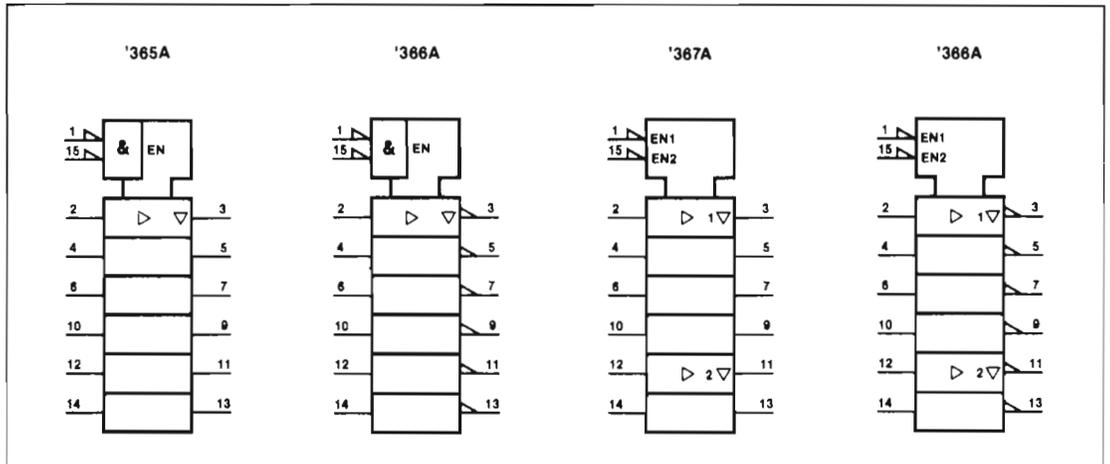
PIN CONFIGURATION

BUFFERS/DRIVERS   54/74365A, 366A, 367A, 368A, LS365A, LS366A, LS367A, LS368A

LOGIC SYMBOL

LOGIC SYMBOL (IEEE/IEC)

ABSOLUTE MAXIMUM RATINGS (Over operating free-air temperature range unless otherwise noted.)

PARAMETER		54	54LS	74	74LS	UNIT
V_{CC}	Supply voltage	7.0	7.0	7.0	7.0	V
V_{IN}	Input voltage	− 0.5 to + 5.5	− 0.5 to + 7.0	− 0.5 to + 5.5	− 0.5 to + 7.0	V
I_{IN}	Input current	− 30 to + 5	− 30 to + 1	− 30 to + 5	− 30 to + 1	mA
V_{OUT}	Voltage applied to output in HIGH output state	− 0.5 to + V_{CC}	− 0.5 to + V_{CC}	− 0.5 to + V_{CC}	− 0.5 to + V_{CC}	V
T_A	Operating free-air temperature range	− 55 to + 125		0 to 70		°C

BUFFERS/DRIVERS 54/74365A, 366A, 367A, 368A, LS365A, LS366A, LS367A, LS368A

RECOMMENDED OPERATING CONDITIONS

PARAMETER			54/74			54/74LS			UNIT
			Min	Nom	Max	Min	Nom	Max	
V_{CC}	Supply voltage	Mil	4.5	5.0	5.5	4.5	5.0	5.5	V
		Com'l	4.75	5.0	5.25	4.75	5.0	5.25	V
V_{IH}	HIGH-level input voltage		2.0			2.0			V
V_{IL}	LOW-level input voltage	Mil			+ 0.8			+ 0.7	V
		Com'l			+ 0.8			+ 0.8	V
I_{IK}	Input clamp current				− 12			− 18	mA
I_{OH}	HIGH-level output current	Mil			− 2.0			− 1.0	mA
		Com'l			− 5.2			− 2.6	mA
I_{OL}	LOW-level output current	Mil			32			12	mA
		Com'l			32			24	mA
T_A	Operating free-air temperature	Mil	− 55		+ 125	− 55		+ 125	°C
		Com'l	0		70	0		70	°C

TEST CIRCUITS AND WAVEFORMS

TEST CIRCUIT FOR 3-STATE OUTPUTS

INPUT PULSE DEFINITIONS

$V_M = 1.3V$ for 54LS/74LS; $V_M = 1.5V$ for all other TTL families.

SWITCH POSITION

Test	Switch 1	Switch 2
t_{PZH}	Open	Closed
t_{PZL}	Closed	Open
t_{PHZ}	Closed	Closed
t_{PLZ}	Closed	Closed

DEFINITIONS

R_L = Load resistor to V_{CC}; 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.
D = Diodes are 1N916, 1N3064, or equivalent.
R_X = 1kΩ for 54/74, 54S/74S, R_X = 5kΩ for 54LS/74LS.
t_{TLH}, t_{THL} Values should be less than or equal to the table entries.

FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	Pulse Width	t_{TLH}	t_{THL}
54/74	3.0V	1MHz	500ns	7ns	7ns
54LS/74LS	3.0V	1MHz	500ns	15ns	6ns
54S/74S	3.0V	1MHz	500ns	2.5ns	2.5ns

BUFFERS/DRIVERS   54/74365A, 366A, 367A, 368A, LS365A, LS366A, LS367A, LS368A

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

| PARAMETER		TEST CONDITIONS[1]		54/74365A, '366A, '367A, '368A Min	Typ[2]	Max	54/74LS365A, '366A, '367A, '368A Min	Typ[2]	Max	UNIT
V_{OH}	HIGH-level output voltage	V_{CC} = MIN, V_{IH} = MIN, V_{IL} = MAX, I_{OH} = MAX	Mil	2.4	3.3		2.4	3.3		V
			Com'l	2.4	3.1		2.4	3.1		V
V_{OL}	LOW-level output voltage	V_{CC} = MIN, V_{IH} = MIN, V_{IL} = MAX I_{OL} = MAX	Mil			0.4		0.25	0.4	V
			Com'l			0.4		0.35	0.5	V
		I_{OL} = 12mA	74LS					0.25	0.4	V
V_{IK}	Input clamp voltage	V_{CC} = MIN, I_I = I_{IK}				-1.5			-1.5	V
I_{OZH}	Off-state output current, HIGH-level voltage applied	V_{CC} = MAX, V_{IH} = MIN, V_{IL} = MAX, V_O = 2.4V				40			20	μA
I_{OZL}	Off-state output current, LOW-level voltage applied	V_{CC} = MAX, V_{IH} = MIN, V_{IL} = MAX, V_O = 0.4V				-40			-20	μA
I_I	Input current at maximum input voltage	V_{CC} = MAX	V_I = 5.5V			1.0				mA
			V_I = 7.0V						0.1	mA
I_{IH}	HIGH-level input current	V_{CC} = MAX	V_I = 2.4V			40				μA
			V_I = 2.7V						20	μA
I_{IL}	LOW-level input current	V_{CC} = MAX	I inputs, V_I = 0.5V Either $\overline{OE}$ input at 2.0V Does not apply to 'LS365A or 'LS367A			-40			-20	μA
			I inputs V_I = 0.4V Both $\overline{OE}$ inputs at 0.4V			-1.6			-0.4	mA
			$\overline{OE}$ inputs V_I = 0.4V			-1.6			-0.4	mA
I_{OS}	Short-circuit output current[3]	V_{CC} = MAX		-40		-130	-30		-130	mA
I_{CC}	Supply current[4] (total)	V_{CC} = MAX	'365A, '367A		65	85		14	24	mA
			'366A, '368A		59	77		12	21	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. I_{OS} is tested with V_{OUT} = + 0.5V and V_{CC} = V_{CC} MAX + 0.5V. Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.
4. Measure I_{CC} with Data inputs grounded and Output Enable inputs at 4.5V.

AC CHARACTERISTICS T_A = 25°C, V_{CC} = 5.0V

PARAMETER		TEST CONDITIONS		54/74 C_L = 50pF, R_L = 400Ω Min	Max	54LS/74LS C_L = 45pF, R_L = 667Ω Min	Max	UNIT
t_{PLH} t_{PHL}	Propagation delay	Waveform 1, '366A, '368A			17 16		15 18	ns
t_{PLH} t_{PHL}	Propagation delay	Waveform 2, '365A, '367A			16 22		16 22	ns
t_{PZH}	Enable to HIGH	Waveform 3			35		35	ns
t_{PZL}	Enable to LOW	Waveform 4	'365A, '367A		37		40	ns
			'366A, '368A		37		45	ns
t_{PHZ}	Disable from HIGH	Waveform 3, C_L = 5pF	'365A, '367A		11		30	ns
			'366A, '368A		11		32	ns
t_{PLZ}	Disable from LOW	Waveform 4, C_L = 5pF			27		35	ns

BUFFERS/DRIVERS 54/74365A, 366A, 367A, 368A, LS365A, LS366A, LS367A, LS368A
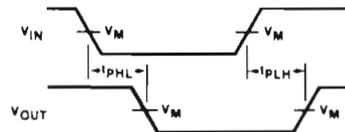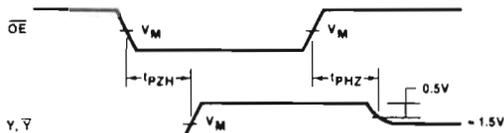
AC WAVEFORMS

WAVEFORM FOR INVERTING OUTPUTS
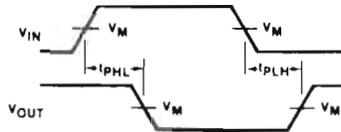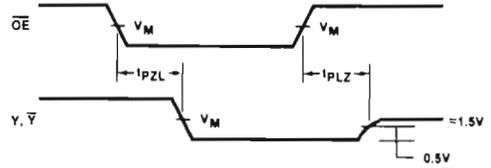
WAVEFORM FOR NON-INVERTING OUTPUTS

Waveform 1

Waveform 2

3-STATE ENABLE TIME TO HIGH LEVEL
AND DISABLE TIME FROM HIGH LEVEL

3-STATE ENABLE TIME TO LOW LEVEL
AND DISABLE TIME FROM LOW LEVEL

Waveform 3

Waveform 4

V_M = 1.3V for 54LS/74LS, V_M = 1.5V for all other TTL families.