

54365A, 54367A, 54368A, 54LS365A, 54LS367A Buffers/Drivers

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

Military Logic Products

Product Specification

FUNCTION TABLE '365A

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)

ORDERING INFORMATION

DESCRIPTION	ORDER CODE
16-Pin Ceramic DIP	54LS365A/BEA, 54365A/BEA 54LS367A/BEA, 54367A/BEA 54368A/BEA
16-Pin Ceramic Flat Pack	54LS365A/BFA, 54LS367A/BFA
16-Pin Ceramic LLCC	54LS365A/B2A, 54LS367A/B2A

FUNCTION TABLE '367A, '368A

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

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION	54	54LS
All	Inputs	1UL	1LSUL
All	Outputs	20UL	30LSUL

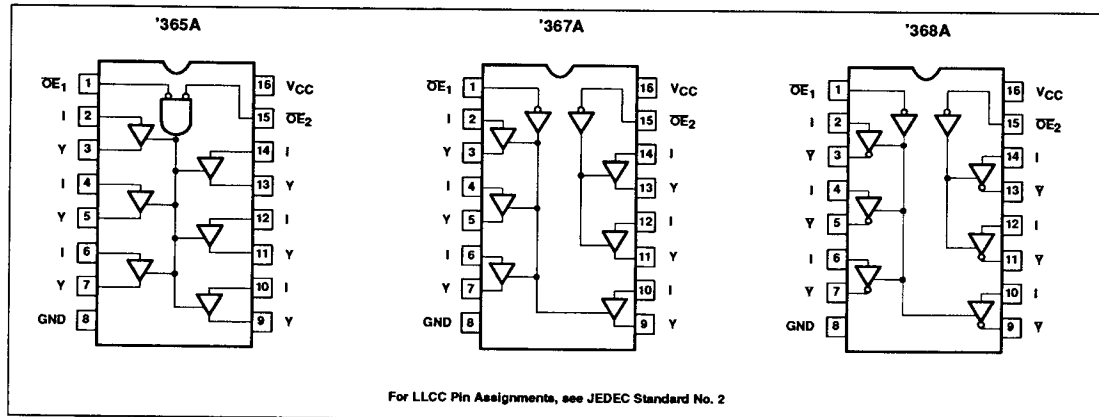
NOTE: Where a 54 Unit Load (UL) is understood to be 40 μ A I_{IH} , and a 54LS Unit Load (LSUL) is 20 μ A I_{IH} and -0.4mA I_{IL} .

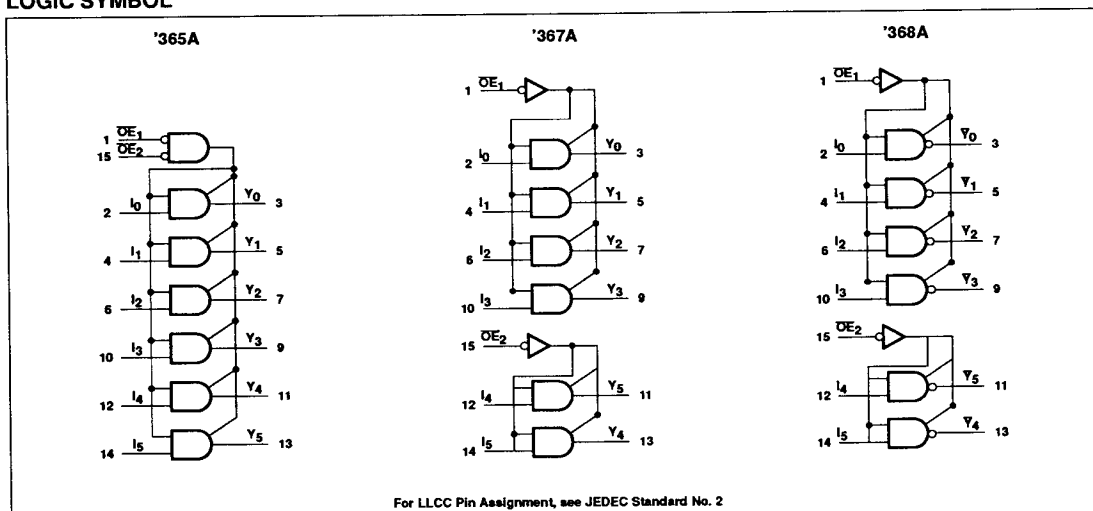
L = Low voltage level
H = High voltage level
X = Don't care
(Z) = High impedance (off) state

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

SYMBOL	PARAMETER	54	54LS	UNIT
V_{CC}	Supply voltage	7.0	7.0	V
V_I	Input voltage range	-0.5 to +5.5	-0.5 to +7.0	V
I_I	Input current range	-30 to +5	-30 to +1	mA
V_O	Voltage applied to output in High output state range	-0.5 to + V_{CC}	-0.5 to + V_{CC}	V
T_{STG}	Storage temperature range	-65 to +150	-65 to +150	°C

PIN CONFIGURATION



Buffers/Drivers**54365A, 54367A, 54368A
54LS365A, 54LS367A****LOGIC SYMBOL****RECOMMENDED OPERATING CONDITIONS**

SYMBOL	PARAMETER	54			54LS			UNIT
		Min	Nom	Max	Min	Nom	Max	
V_{CC}	Supply voltage	4.5	5.0	5.5	4.5	5.0	5.5	V
V_{IH}	High-level input voltage	2.0			2.0			V
V_{IL}	Low-level input voltage			+0.8			+0.7	V
I_{IK}	Input clamp current			-12			-18	mA
I_{OH}	High-level output current			-2.0			-1.0	mA
I_{OL}	Low-level output current			32			12	mA
T_A	Operating free-air temperature range	-55		+125	-55		+125	°C

Buffers/Drivers**54365A, 54367A, 54368A
54LS365A, 54LS367A****DC ELECTRICAL CHARACTERISTICS** (Over recommended operating free-air temperature range unless otherwise noted.)

SYMBOL	PARAMETER	TEST CONDITIONS ¹	54365A, '367A, '368A			54LS365A, '367A			UNIT
			Min	Typ ²	Max	Min	Typ ²	Max	
V _{OH}	High-level output voltage	V _{CC} = Min, V _{IH} = Min, V _{IL} = Max, I _{OH} = Max	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			0.4		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 _{IH2}	Input current at maximum input voltage	V _{CC} = Max V _I = 5.5V			1.0				mA
		V _I = 7.0V						0.1	mA
I _{IH1}	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 OE input at 2.0V (Does not apply to 'LS365A or 'LS367A)			-40				μA
		I inputs, V _I = 0.4V Both OE inputs at 0.4V			-1.6			-0.4	mA
		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
		'368A		59	77		12	21	mA

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

SYMBOL	PARAMETER	TEST CONDITIONS	54		54LS		UNIT
			C _L = 50pF		C _L = 50pF		
			Min	Max	Min	Max	
t _{PLH} t _{PHL}	Propagation delay	Waveform 1, '368A		17 16		15 18	ns ns
t _{PLH} t _{PHL}	Propagation delay	Waveform 2, '365A, '367A		16 22		16 22	ns ns
t _{PZH}	Enable to High	Waveform 3		35		35	ns
t _{PZL}	Enable to Low	Waveform 4	'365A, '367A	37		40	ns
			'368A	37		45	ns
t _{PHZ}	Disable from High	Waveform 3, C _L = 5pF ⁵	'365A, '367A	11		30	ns
			'368A	11		32	ns
t _{PLZ}	Disable from Low	Waveform 4, C _L = 5pF ⁵		27		35	ns
t _{PHZ}	Disable from High	Waveform 3, C _L = 50pF	'365A, '367A	21		48	ns
			'368A	21		48	ns
t _{PLZ}	Disable from Low	Waveform 4, C _L = 50pF		28		37	ns

Buffers/Drivers

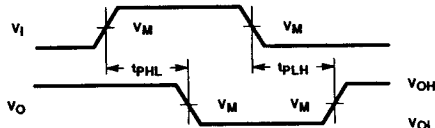
54365A, 54367A, 54368A
54LS365A, 54LS367A

AC ELECTRICAL CHARACTERISTICS $T_A = -55^\circ\text{C}$ and $+125^\circ\text{C}$, $V_{CC} = 5.0\text{V}^6$

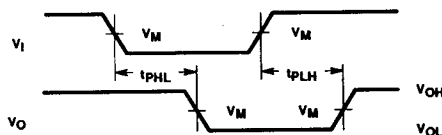
AC ELECTRICAL CHARACTERISTICS $V_A = -0.5\text{ V}$ and $+12.5\text{ V}$, $V_{CC} = 0.5\text{ V}$								
SYMBOL	PARAMETER	TEST CONDITIONS		54		54LS		UNIT
				$C_L = 50\text{pF}$		$C_L = 50\text{pF}$		
				Min	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay	Waveform 1, '368A			22 21		20 23	ns ns
t_{PLH} t_{PHL}	Propagation delay	Waveform 2, '365A, '367A			21 27		21 29	ns ns
t_{PZH}	Enable to High	Waveform 3			40		40	ns
t_{PZL}	Enable to Low	Waveform 4	'365A, '367A		42		52	ns
			'368A		42		59	ns
t_{PHZ}	Disable from High	Waveform 3, $C_L = 5\text{pF}^5$	'365A, '367A		16		39	ns
			'368A		16		42	ns
t_{PLZ}	Disable from Low	Waveform 4, $C_L = 5\text{pF}^5$			30		40	ns
t_{PHZ}	Disable from High	Waveform 3, $C_L = 50\text{pF}$	'365A, '367A		20		60	ns
			'368A		20		62	ns
t_{PLZ}	Disable from Low	Waveform 4, $C_L = 50\text{pF}$			32		48	ns

NOTES:

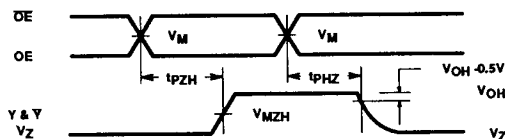
- For conditions shown as Min or Max, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at $V_{CC} = 5\text{V}$, $T_A = 25^\circ\text{C}$.
- Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.
- Measure I_{CC} with Data inputs grounded and Output Enable inputs $\geq 4.0\text{V}$.
- Guaranteed by 50pF limits, but not tested.
- These parameters are guaranteed, but not tested.

AC WAVEFORMS

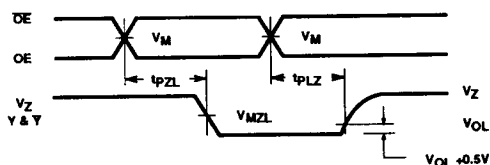
Waveform 1. Waveform for Inverting Outputs



Waveform 2. Waveform for Non-Inverting Outputs



Waveform 3. 3-State Output Enable Time to High Level and Output Disable Time from High Level



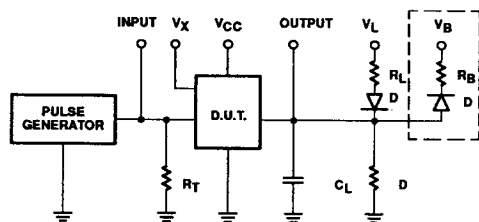
Waveform 4. 3-State Output Enable Time to Low Level and Output Disable Time from Low Level

FAMILY	V_M	V_{MZL}	V_{MZH}	V_Z
54LSXXX	1.3V	0.7V	1.9V	1.45V
54XXX	1.5V	0.7V	1.9V	1.45V

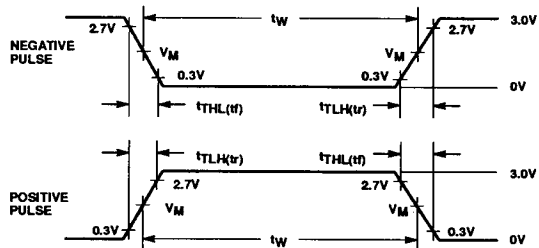
Buffers/Drivers

54365A, 54367A, 54368A
54LS365A, 54LS367A

TEST CIRCUIT AND WAVEFORM



Test Circuit for 54 3-State Outputs



Input Pulse Definition

FAMILY	INPUT PULSE CHARACTERISTICS							
	R_1	R_X	V_L	V_M	Rep. Rate	T_W	T_{TLH}	T_{THL}
54LSXXX	110 Ω	2.4k Ω	2.1V	1.3V	1MHz	500ns	≤ 15 ns	≤ 6 ns
54XXX	31 Ω	1.2k Ω	2.1V	1.5V	1MHz	500ns	≤ 7 ns	≤ 7 ns

Optional load for 54LSXXX only: $R_B = 631\Omega$; $V_B = 5.5V$ for all tests except T_{PHZ} ; $V_B = -0.6V$ for T_{PHZ} test.

DEFINITIONS:

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.

V_X = Unclocked pins must be held at $\leq 0.8V$, $\geq 2.7V$ or open per FunctionTable.