

## 54LS125 Buffer

Military Logic Products

Quad 3-State Buffer

Product Specification

### FUNCTION TABLE

INPUTS		OUTPUT
C	A	Y
L	L	H
L	H	H
H	X	(Z)

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

### ORDERING INFORMATION.

DESCRIPTION	ORDER CODE
Ceramic DIP	54LS125/BCA
Ceramic Flat Pack	54LS125/BDA
Ceramic LLCC	54LS125/B2A

### INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

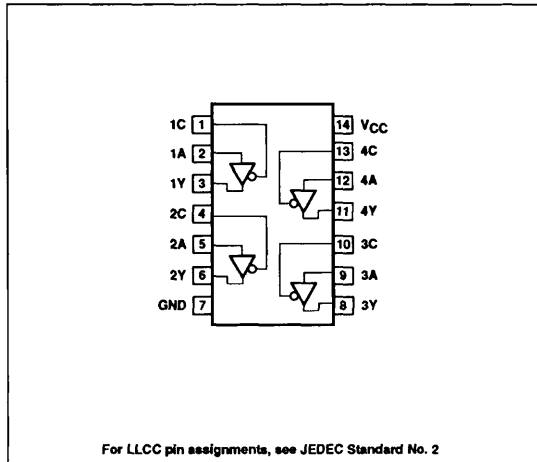
PINS	DESCRIPTION	54LS
All	Inputs	1LSUL
All	Outputs	30LSUL

NOTE: Where a 54LS Unit Load (LSUL) is  $20\mu\text{A } I_{IH}$  and  $-0.4\text{mA } I_{IL}$ .

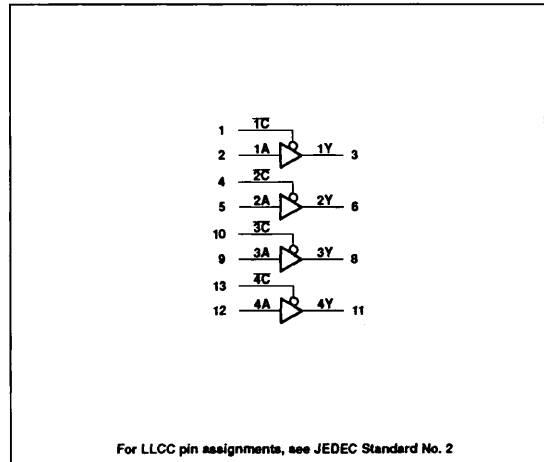
### ABSOLUTE MAXIMUM RATINGS (Over operating free-air temperature range unless otherwise noted.)

SYMBOL	PARAMETER	RATING	UNIT
$V_{CC}$	Supply voltage	7.0	V
$V_I$	Input voltage range	-0.5 to +7.0	V
$I_I$	Input current range	-30 to +1	mA
$V_O$	Voltage applied to output in High output state range	-0.5 to $+V_{CC}$	V
$T_{STG}$	Storage temperature range	-65 to +150	$^{\circ}\text{C}$

### PIN CONFIGURATION



### LOGIC SYMBOL



## Buffer

54LS125

## 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			+0.7	V
$I_{IK}$	Input clamp current			-18	mA
$I_{OH}$	High-level output current			-1.0	mA
$I_{OL}$	Low-level output current			12	mA
$T_A$	Operating free-air temperature range	-55		+125	°C

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

SYMBOL	PARAMETER	TEST CONDITIONS <sup>1</sup>	LIMITS			UNIT
			Min	Typ <sup>2</sup>	Max	
$V_{OH}$	High-level output voltage	$V_{CC} = \text{Min}, V_{IH} = \text{Min}, V_{IL} = \text{Max}, I_{OH} = \text{Max}$	2.4			V
$V_{OL}$	Low-level output voltage	$V_{CC} = \text{Min}, V_{IH} = \text{Min}, V_{IL} = \text{Max}, I_{OL} = \text{Max}$		0.25	0.4	V
$V_{IK}$	Input clamp voltage	$V_{CC} = \text{Min}, I_I = I_{IK}$			-1.5	V
$I_{OZH}$	Off-state output current, High-level voltage applied	$V_{CC} = \text{Max}, V_{IH} = \text{Min}, V_{IL} = \text{Max}, V_O = 2.4V$			20	$\mu\text{A}$
$I_{OZL}$	Off-state output current, Low-level voltage applied	$V_{CC} = \text{Max}, V_{IH} = \text{Min}, V_{IL} = \text{Max}, V_O = 0.4V$			-20	$\mu\text{A}$
$I_{IH2}$	Input current at maximum input voltage	$V_{CC} = \text{Max}, V_I = 7.0V$			0.1	mA
$I_{IH1}$	High-level input current	$V_{CC} = \text{Max}, V_I = 2.7V$			20	$\mu\text{A}$
$I_{IL}$	Low-level input current	$V_{CC} = \text{Max}, V_I = 0.4V$			-0.4	mA
$I_{OS}$	Short-circuit output current <sup>3</sup>	$V_{CC} = \text{Max}$	-40		-130	mA
$I_{CC}$	Supply current (total)	$V_{CC} = \text{Max}$		11	20	mA

AC ELECTRICAL CHARACTERISTICS  $T_A = 25^\circ\text{C}, V_{CC} = 5.0V$ 

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS		UNIT
			$C_L = 50\text{pF}$		
			Min	Max	
$t_{PLH}$ $t_{PHL}$	Propagation delay Data to output	Waveform 1		15 18	ns ns
$t_{PZH}$	Enable to High	Waveform 2		20	ns
$t_{PZL}$	Enable to Low	Waveform 3		25	ns
$t_{PHZ}$	Disable from High	Waveform 2, $C_L = 5\text{pF}$		20	ns
$t_{PLZ}$	Disable from Low	Waveform 3, $C_L = 5\text{pF}$		20	ns
$t_{PHZ}$	Disable from High	Waveform 2, $C_L = 50\text{pF}$		36	ns
$t_{PLZ}$	Disable from Low	Waveform 3, $C_L = 50\text{pF}$		22	ns

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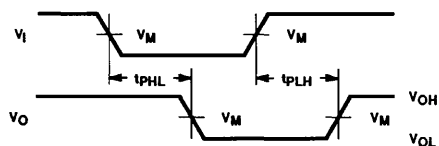
## AC ELECTRICAL CHARACTERISTICS $T_A = -55^\circ\text{C}$ and $+125^\circ\text{C}$ , $V_{CC} = 5.0\text{V}^4$

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS		UNIT
			$C_L = 50\text{pF}$		
			Min	Max	
$t_{PLH}$ $t_{PHL}$	Propagation delay Data to output	Waveform 1		20 24	ns ns
$t_{pZH}$	Enable to High	Waveform 2		26	ns
$t_{pZL}$	Enable to Low	Waveform 3		33	ns
$t_{PHZ}$	Disable from High	Waveform 2, $C_L = 5\text{pF}$		26	ns
$t_{PLZ}$	Disable from Low	Waveform 3, $C_L = 5\text{pF}$		26	ns
$t_{PHZ}$	Disable from High	Waveform 2, $C_L = 50\text{pF}$		47	ns
$t_{PLZ}$	Disable from Low	Waveform 3, $C_L = 50\text{pF}$		29	ns

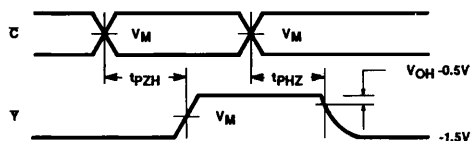
**NOTES:**

1. For conditions shown as Min or Max, use the appropriate value specified under recommended operating conditions for the applicable type and function table for operating mode.
2. All typical values are at  $V_{CC} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ .
3. Not more than one output should be shorted at a time and the duration of the short circuit should not exceed one second.
4. These parameters are guaranteed, but not tested.

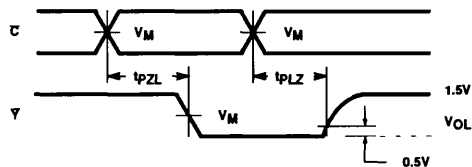
### AC WAVEFORMS



Waveform 1. Waveform for Non-Inverting Outputs



Waveform 2. 3-State Enable Time to High Level and Disable Time from High Level



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

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

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## TEST CIRCUIT AND WAVEFORM

**Test Circuit for 54 3-State Outputs**

**Input Pulse Definition**

FAMILY	INPUT PULSE CHARACTERISTICS							
	$R_L$	$R_X$	$V_L$	$V_M$	Rep. Rate	$T_w$	$T_{TLH}$	$T_{THL}$
54LSXXX	110 $\Omega$	2.4k $\Omega$	2.1V	1.3V	1MHz	500ns	$\leq 15$ ns	$\leq 6$ 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 Function Table.