Quad buffer (3-State)

54ABT125

FEATURES

- Quad bus interface
- 3-State buffers
- Output capability: +48mA/–24mA
- Latch–up protection exceeds 500mA per Jedec JC40.2 Std 17
- ESD protection exceeds 2000V per MIL STD 883 Method 3015 and 200V per Machine Model

DESCRIPTION

The 54ABT125 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 54ABT125 device is a quad buffer that is ideal for driving bus lines. The device features four Output Enables ($\overline{OE}0$, $\overline{OE}1$, $\overline{OE}2$, $\overline{OE}3$), each controlling one of the 3-State outputs.

ORDERING INFORMATION

DESCRIPTION	ORDER CODE	PACKAGE DESIGNATOR*
14-pin Ceramic DIP	54ABT125/BLA	GDIP1-T14
20-pin Ceramic LLCC	54ABT125/B2A	CQCC2-N20

* MIL-STD 1835 or Appendix A of 1995 Military Data Handbook

FUNCTION TABLE

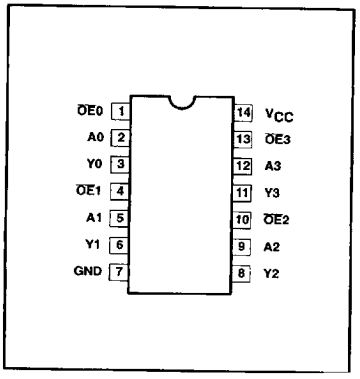
INPUTS		OUTPUT
$\overline{OE}n$	An	Yn
L	L	L
L	H	H
H	X	Z

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

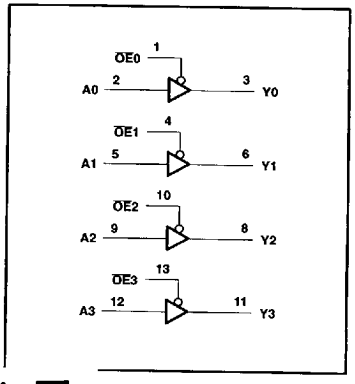
PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
2, 5, 9, 12	A0 – A3	Data inputs
3, 6, 8, 11	Y0 – Y3	Data outputs
1, 4, 10, 13	$\overline{OE}0$ – $\overline{OE}3$	Output enable inputs (active–Low)
7	GND	Ground (0V)
14	V_{CC}	Positive supply voltage

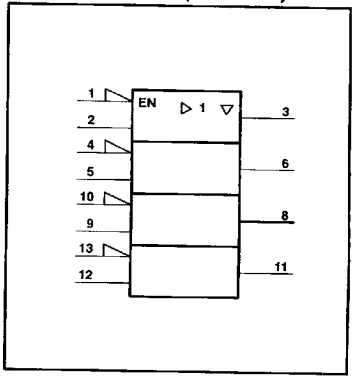
PIN CONFIGURATION



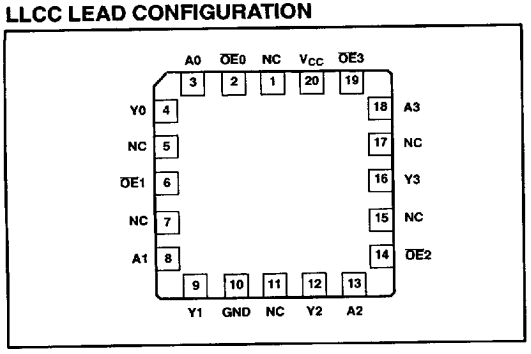
LOGIC SYMBOL



LOGIC SYMBOL (IEEE/EC)



LLCC LEAD CONFIGURATION



ABSOLUTE MAXIMUM RATINGS[1, 2]

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V_{CC}	DC supply voltage		–0.5 to +7.0	V
I_{IK}	DC input diode current	$V_I < 0$	–18	mA
V_I	DC input voltage[3]		–1.2 to +7.0	V
I_{OK}	DC output diode current	$V_O < 0$	–50	mA
V_{OUT}	DC output voltage[3]	output in Off or High state	–0.5 to +5.5	V
I_{OUT}	DC output current	output in Low state	96	mA
T_{stg}	Storage temperature range		–65 to 150	°C

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS		UNIT
		MIN	MAX	
V_{CC}	DC supply voltage	4.5	5.5	V
V_I	Input voltage	0	V_{CC}	V
V_{IH}	High-level input voltage	2.0		V
V_{IL}	Input voltage		0.8	V
I_{OH}	High-level output current		–24	mA
I_{OL}	Low-level output current		48	mA
$\Delta t/\Delta v$	Input transition nse or fall rate	0	5	ns/V
T_{amb}	Operating free-air temperature range	–55	+125	°C

DC ELECTRICAL CHARACTERISTICS

V_{CC} = MAX, V_I = V_{IL} or V_{IH}, unless otherwise noted.

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			T_{amb} = −55 to +125°C			
			MIN	TYP[7]	MAX	
V_{IK}	Input clamp voltage	V_{CC} = 4.5V; I_{IK} = −18mA		−0.9	−1 2	V
V_{OH}	High-level output voltage	V_{CC} = 4.5V; I_{OH} = −3mA	2.5	2.9		V
		V_{CC} = 5.0V; I_{OH} = −3mA	3.0	3.4		V
		V_{CC} = 4.5V; I_{OH} = −24mA	2.0	2 7		V
V_{OL}	Low-level output voltage	V_{CC} = 4.5V; I_{OL} = 48mA		0.37	0.55	V
I_I	Input leakage current	V_I = GND or 5.5V		±0.01	±1.0	µA
I_{OZH}[6]	3-State output High current	V_O = 2.7V; V_I = V_{IL} or 3.0V		0 1	10	µA
I_{OZL}[6]	3-State output Low current	V_O = 0.5V; V_I = V_{IL} or 3.0V		−0.1	−10	µA
I_O	Output current[4]	V_O = 2.5V, V_I = GND or V_{CC}	−50	−100	−180	mA
I_{OFF}	Power off leakage current	V_{CC} = 0V, V_I or V_O ≤ 4 5V, T_A = 25°C only	−100	0.05	100	µA
I_{CEX}	Output High leakage current	V_{CC} = 5.5V, V_O = 5.5V		0.1	50	µA
I_{CCH}	Quiescent supply current	Outputs High, V_I = GND or V_{CC}		50	250	µA
I_{CCL}		Outputs Low, V_I = GND or V_{CC}		12	15	mA
I_{CCZ}		Outputs 3–State; V_I = GND or V_{CC}		50	250	µA
ΔI_{CC}	Additional supply current per input pin[5]	Outputs 3–State, one input at 3.4V, other inputs at V_{CC} or GND; V_{CC} = 5.5V		0.5	1.5	mA

NOTES:

1. Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
2. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150°C.
3. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
4. Not more than one output should be tested at a time, and the duration of the test should not exceed one second.
5. This is the increase in supply current for each input at 3.4V.
6. To accommodate ATE tester limitations, I_{OZ} tests are tested with V_{IH} = 3.0V but 2.0V V_{IH} is guaranteed.
7. All typical values are at T_{amb} = 25°C.

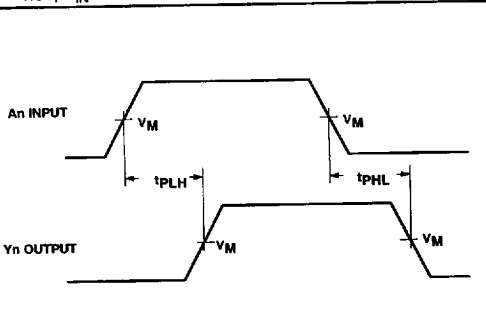
AC CHARACTERISTICS

GND = 0V, t_R = t_F = 2.5ns; C_L = 50pF, R_L = 500Ω

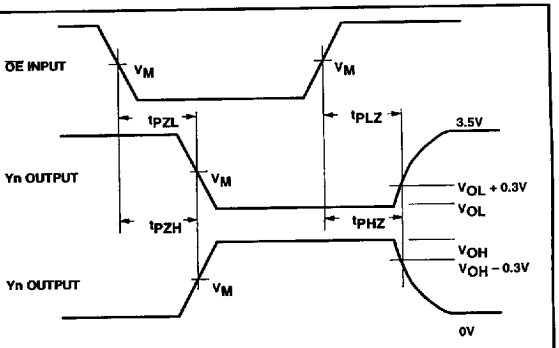
SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT
			T_{amb} = +25°C V_{CC} = +5.0V			T_{amb} = −55°C to +125°C V_{CC} = +5.0V ±10%		
			MIN	TYP	MAX	MIN	MAX	
t_{PLH} t_{PHL}	Propagation delay An to Yn	1	1.0 1 0	2.9 2 5	4.1 4.6	1.0 1.0	4.6 4 9	ns
t_{PZH} t_{PZL}	Output enable time to High and Low level	2	1.0 1.0	2 9 2 5	4.2 6.2	1.0 1.0	5.1 6.8	ns
t_{PHZ} t_{PLZ}	Output disable time from High and Low level	2	1.0 1.5	3.8 3.5	5 4 5.0	1.0 1.5	6 2 5.5	ns

AC WAVEFORMS

V_M = 1.5V, V_{IN} = GND to 3.0V

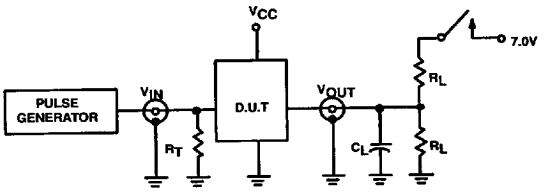


Waveform 1. Waveforms Showing the Input (An) to Output (Yn) Propagation Delays

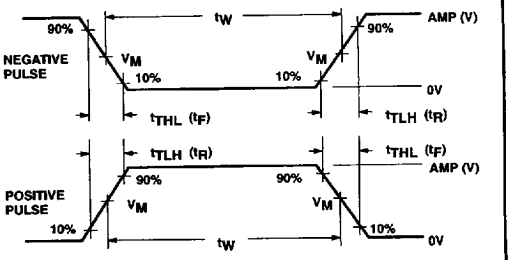


Waveform 2. Waveforms Showing the 3–State Output Enable and Disable Times

TEST CIRCUIT AND WAVEFORMS



Test Circuit for 3–State Outputs



V_M = 1.5V
Input Pulse Definition

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.

INPUT PULSE REQUIREMENTS				
Amplitude	Rep. Rate	t_W	t_R	t_F
3.0V	1MHz	500ns	2.5ns	2.5ns