16-bit buffer/line driver (3-State)

74ABT16244

FEATURES

- 16-bit bus interface
- Multiple V_{CC} and GND pins minimize switching noise
- Power-up 3-State
- 3-State buffers
- Output capability: +64 mA/–32mA
- Latch–up protection exceeds 500mA per Jedec JC40.2 Std 17
- ESD protection exceeds 2000 V per MIL STD 883 Method 3015 and 200 V per Machine Model

DESCRIPTION

The 74ABT16244 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT16244 device is an 16-bit buffer that is ideal for driving bus lines. The device features four Output Enables (1OE, 2OE, 3OE, 4OE), each controlling four of the 3-State outputs.
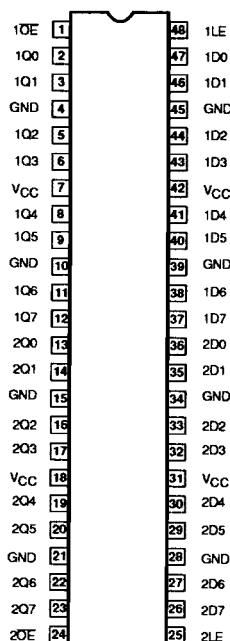
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS $T_{amb} = 25°C$; GND = 0V	TYPICAL	UNIT
t_{PLH} t_{PHL}	Propagation delay nAx to nYx	$C_L = 50pF$; $V_{CC} = 5V$	3.2	ns
C_{IN}	Input capacitance	$V_I = 0V$ or V_{CC}	4	pF
C_{OUT}	Output capacitance	$V_O = 0V$ or V_{CC}; 3-State	7	pF
I_{CCZ}	Total supply current	Outputs disabled; $V_{CC} = 5.5V$	500	nA

ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	ORDER CODE	DRAWING NUMBER
48-pin SSOP	–40°C to +85°C	74ABT16244DL	TBD

PIN CONFIGURATION

LOGIC SYMBOL
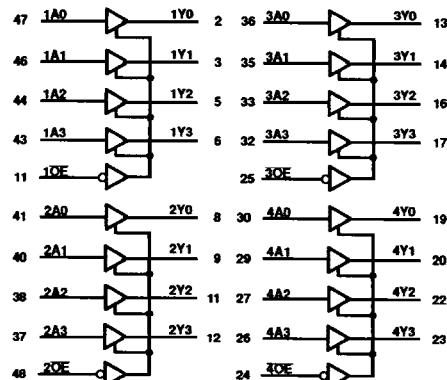
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FUNCTION TABLE

INPUTS		OUTPUTS
n$\overline{\text{OE}}$	nAx	nYx
L	L	L
L	H	H
H	X	Z

PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
47, 46, 44, 43 41, 40, 38, 37 36, 35, 33, 32 30, 29, 27, 26	1A0 – 1A3, 2A0 – 2A3, 3A0 – 3A3, 4A0 – 4A3	Data inputs
2, 3, 5, 6 8, 9, 11, 12 13, 14, 16, 17 19, 20, 22, 23	1Y0 – 1Y3, 2Y0 – 2Y3, 3Y0 – 3Y3, 4Y0 – 4Y3	Data outputs
1, 48 25, 24	1$\overline{\text{OE}}$, 2$\overline{\text{OE}}$, 3$\overline{\text{OE}}$, 4$\overline{\text{OE}}$	Output enables
4, 10, 15, 21 28, 34, 39, 45	GND	Ground (0V)
7, 18, 31, 42	V$_{CC}$	Positive supply voltage

LOGIC SYMBOL (IEEE/IEC)
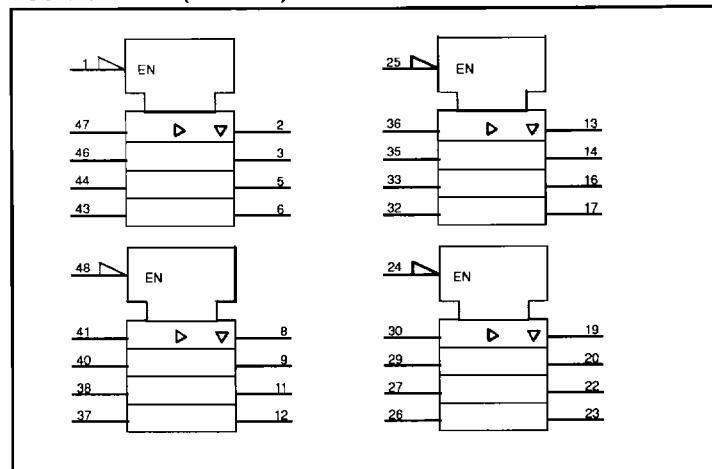
ABSOLUTE MAXIMUM RATINGS[1, 2]

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	128	mA
T_{stg}	Storage temperature range		−65 to 150	°C

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.

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}	Low-level input voltage		0.8	V
I_{OH}	High-level output current		−32	mA
I_{OL}	Low-level output current		64	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	0	10	ns/V
T_{amb}	Operating free-air temperature range	−40	+85	°C

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DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS					UNIT
			T_{amb} = +25°C			T_{amb} = −40°C to +85°C		
			Min	Typ	Max	Min	Max	
V_{IK}	Input clamp voltage	V_{CC} = 4.5V; I_{IK} = −18mA		−0.9	−1.2		−1.2	V
V_{OH}	High–level output voltage	V_{CC} = 4.5V; I_{OH} = −3mA; V_I = V_{IL} or V_{IH}	2.5	2.9		2.5		V
		V_{CC} = 5.0V; I_{OH} = −3mA; V_I = V_{IL} or V_{IH}	3.0	3.4		3.0		V
		V_{CC} = 4.5V; I_{OH} = −32mA; V_I = V_{IL} or V_{IH}	2.0	2.4		2.0		V
V_{OL}	Low–level output voltage	V_{CC} = 4.5V; I_{OL} = 64mA; V_I = V_{IL} or V_{IH}		0.42	0.55		0.55	V
I_I	Input leakage current	V_{CC} = 5.5V; V_I = GND or 5.5V		±0.01	±1.0		±1.0	μA
I_{OFF}	Power-off leakage current	V_{CC} = 0.0V; V_O or V_I ≤ 4.5V		±5.0	±100		±100	μA
$I_{PU/PD}$	Power-up/down 3-State output current	V_{CC} = 2.0V; V_O = 0.5V; V_I = GND or V_{CC}; V_{OE} = V_{CC}		±5.0	±50		±50	μA
I_{OZH}	3-State output High current	V_{CC} = 5.5V; V_O = 2.7V; V_I = V_{IL} or V_{IH}		5.0	50		50	μA
I_{OZL}	3-State output Low current	V_{CC} = 5.5V; V_O = 0.5V; V_I = V_{IL} or V_{IH}		−5.0	−50		−50	μA
I_{CEX}	Output High leakage current	V_{CC} = 5.5V; V_O = 5.5V; V_I = GND or V_{CC}		5.0	50		50	μA
I_O	Output current[1]	V_{CC} = 5.5V; V_O = 2.5V	−50	−100	−180	−50	−180	mA
I_{CCH}	Quiescent supply current	V_{CC} = 5.5V; Outputs High, V_I = GND or V_{CC}		50	100		100	μA
I_{CCL}		V_{CC} = 5.5V; Outputs Low, V_I = GND or V_{CC}		48	60		60	mA
I_{CCZ}		V_{CC} = 5.5V; Outputs 3-State; V_I = GND or V_{CC}		50	100		100	μA
ΔI_{CC}	Additional supply current per input pin[2]	Outputs enabled, one input at 3.4V, other inputs at V_{CC} or GND; V_{CC} = 5.5V		0.5	1.5		1.5	mA

NOTES:
1. Not more than one output should be tested at a time, and the duration of the test should not exceed one second.
2. This is the increase in supply current for each input at 3.4V.

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} = −40°C to +85°C V_{CC} = +5.0V ±0.5V		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay nAx to nYx	1	1.0 1.0	2.3 2.3	3.2 3.7	1.0 1.0	3.5 4.1	ns
t_{PZH} t_{PZL}	Output enable time to High and Low level	2	1.0 1.0	2.6 2.9	3.8 5.5	1.0 1.0	4.6 6.2	ns
t_{PHZ} t_{PLZ}	Output disable time from High and Low level	2	1.7 1.5	3.8 3.2	4.7 4.7	1.7 1.5	5.6 5.6	ns

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AC WAVEFORMS

$V_M = 1.5V$, $V_{IN} = $ GND to 3.0V
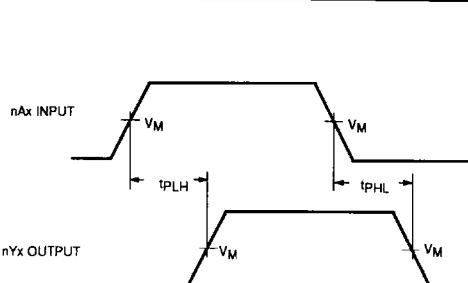
Waveform 1. Waveforms Showing the Input (An) to Output (Yn) Propagation Delays
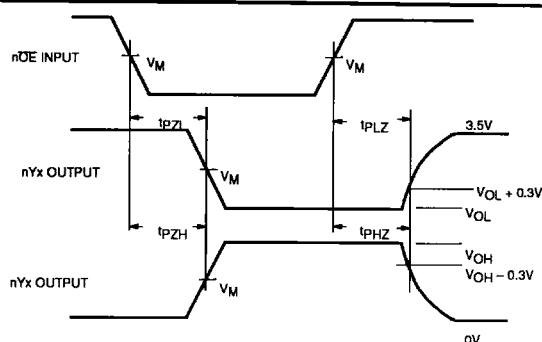
Waveform 2. Waveforms Showing the 3-State Output Enable and Disable Times

TEST CIRCUIT AND WAVEFORMS
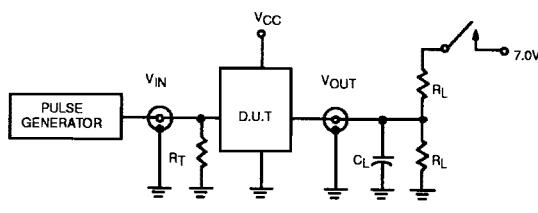
Test Circuit for 3–State Outputs

$V_M = 1.5V$
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.

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