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

74ABT16244A
74ABTH16244A

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
- Live insertion/extraction permitted
- Latch-up protection exceeds 500mA per JEDEC Std 17
- ESD protection exceeds 2000 V per MIL STD 883 Method 3015 and 200 V per Machine Model
- 74ABTH16244A incorporates bus hold data inputs which eliminate the need for external pull up resistors to hold unused inputs
- Bus-hold data inputs eliminate the need for external pull-up resistors to hold unused inputs

DESCRIPTION

The 74ABT16244A high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT16244A device is a 16-bit buffer that is ideal for driving bus lines. The device features four Output Enables ($1\overline{OE}$, $2\overline{OE}$, $3\overline{OE}$, $4\overline{OE}$), each controlling four of the 3-State outputs.
Two options are available, 74ABT16244A which does not have the bus hold feature and 74ABTH16244A which incorporates the bus hold feature.

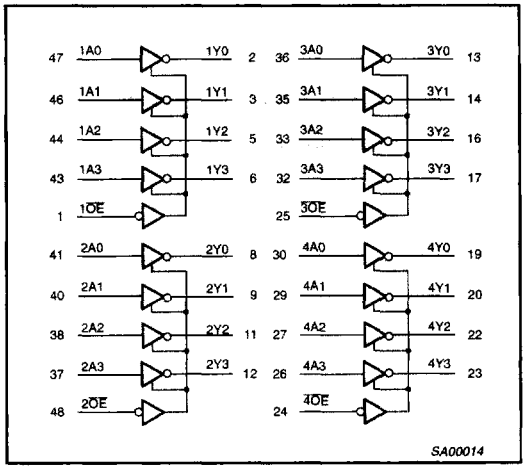
QUICK REFERENCE DATA

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	1.7 2.1	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}	Quiescent supply current	Outputs disabled; V_{CC} = 5.5V	450	µA
I_{CCL}		Outputs low; V_{CC} = 5.5V	10	mA

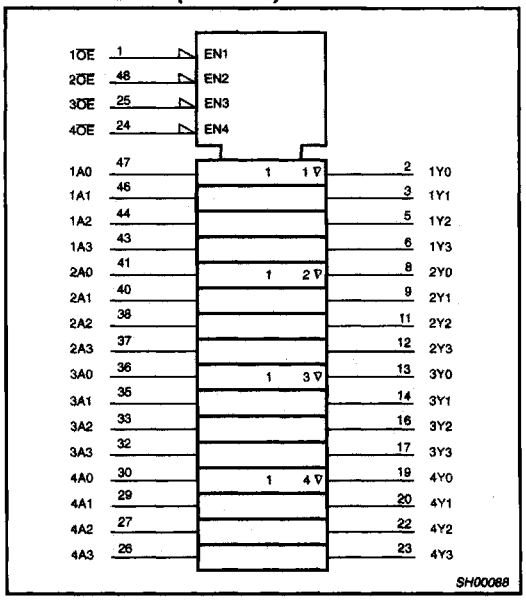
ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	NORTH AMERICA	DWG NUMBER
48-Pin Plastic SSOP Type III	–40°C to +85°C	74ABT16244A DL	BT16244A DL	SOT370-1
48-Pin Plastic TSSOP Type II	–40°C to +85°C	74ABT16244A DGG	BT16244A DGG	SOT362-1
48-Pin Plastic SSOP Type III	–40°C to +85°C	74ABH16244A DL	BH16244A DL	SOT370-1
48-Pin Plastic TSSOP Type II	–40°C to +85°C	74ABH16244A DGG	BH16244A DGG	SOT362-1

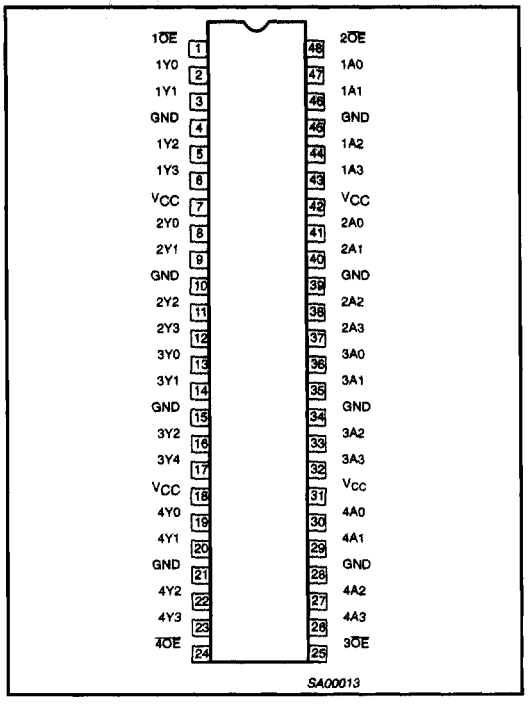
LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



PIN CONFIGURATION



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	$1\overline{OE}$, $2\overline{OE}$, $3\overline{OE}$, $4\overline{OE}$	Output enables
4, 10, 15, 21 28, 34, 39, 45	GND	Ground (0V)
7, 18, 31, 42	V_{CC}	Positive supply voltage

FUNCTION TABLE

INPUTS		OUTPUTS
$n\overline{OE}$	nAx	nYx
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

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
		output in High state	−64	
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

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_{CC} = 4.5V; I_{OH} = −32mA; V_I = V_{IL} or V_{IH}	2.0	2.4		2.0		
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_I	Input leakage current 74ABTH16244A	V_{CC} = 5.5V; V_I = V_{CC} or GND (Control pins)		±0.01	±1		±1	µA
		V_{CC} = 5.5V; V_I = V_{CC} (Data Pins)		0.01	1		1	
		V_{CC} = 5.5V; V_I = 0 (Data Pins)		−2	−3		−5	
I_{HOLD}	Bus Hold current A inputs[4] 74ABTH16244A	V_{CC} = 4.5V; V_I = 0.8V	50			50		µA
		V_{CC} = 4.5V; V_I = 2.0V	−75			−75		
		V_{CC} = 5.5V; V_I = 0 to 5.5V	±500					
I_{OFF}	Power-off leakage current	V_{CC} = 0.0V; V_O or V_I ≤ 4.5V		±5.0	±100		±100	µA
I_{PU}/I_{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 = 5.5V; V_I = V_{IL} or V_{IH}		0.1	10		10	µA
I_{OZL}	3-State output Low current	V_{CC} = 5.5V; V_O = 0.0V; V_I = V_{IL} or V_{IH}		−0.1	−10		−10	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[3]	V_{CC} = 5.5V; Outputs High, V_I = GND or V_{CC}		0.45	1.0		1.0	mA
I_{CCL}		V_{CC} = 5.5V; Outputs Low, V_I = GND or V_{CC}		10	19		19	mA
I_{CCZ}		V_{CC} = 5.5V; Outputs 3-State; V_I = GND or V_{CC}		0.45	1.0		1.0	µA
ΔI_{CC}	Additional supply current per input pin[2, 3]	Outputs enabled, one data input at 3.4V, other inputs at V_{CC} or GND; V_{CC} = 5.5V		100	250		250	µA
		Outputs disabled, one data input at 3.4V, other inputs at V_{CC} or GND; V_{CC} = 5.5V		100	250		250	
		Control pins, outputs disabled, one enable input at 3.4V, other inputs at V_{CC} or GND; V_{CC} = 5.5V		100	250		250	

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.
3. This data sheet limit may vary among suppliers.
4. This is the bus hold overdrive current required to force the input to the opposite logic state.

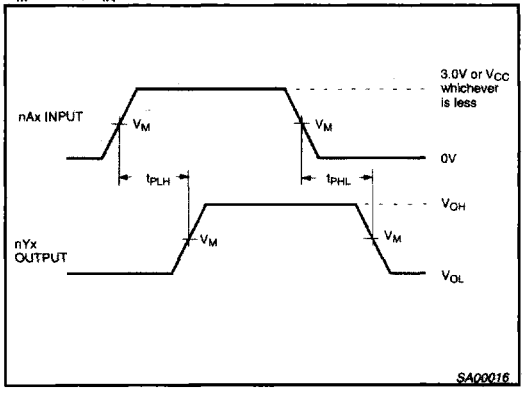
AC CHARACTERISTICS

GND = 0V; $t_R = t_F = 2.5ns$; $C_L = 50pF$, $R_L = 500\Omega$

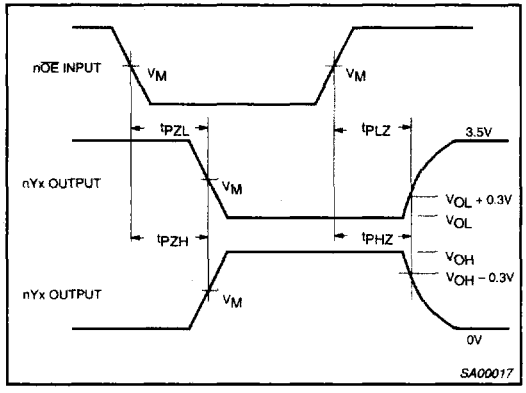
SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT
			$T_{amb} = +25°C$ $V_{CC} = +5.0V$			$T_{amb} = -40°C$ to $+85°C$ $V_{CC} = +5.0V \pm 0.5V$		
			MIN	TYP	MAX	MIN	MAX	
t_{PLH} t_{PHL}	Propagation delay nAx to nYx	1	1.1 1.3	1.7 2.1	2.6 2.9	1.1 1.3	2.8 3.4	ns
t_{PZH} t_{PZL}	Output enable time to High and Low level	2	1.6 2.3	2.7 3.5	3.7 4.0	1.6 2.3	4.5 4.8	ns
t_{PHZ} t_{PLZ}	Output disable time from High and Low level	2	2.0 1.6	3.0 2.4	4.0 3.2	2.0 1.6	4.6 4.1	ns

AC WAVEFORMS

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

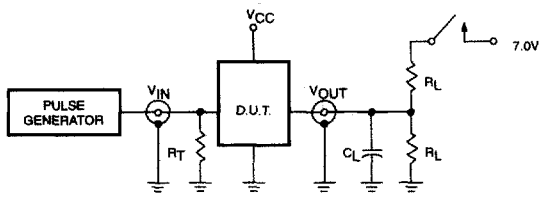


Waveform 1. Input (An) to Output (Yn) Propagation Delays

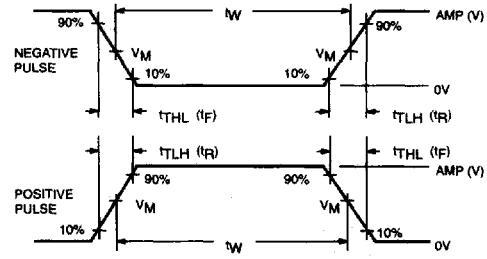


Waveform 2. 3-State Output Enable and Disable Times

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
74ABT/H16	3.0V	1MHz	500ns	2.5ns	2.5ns

SA00018