- **State-of-the-Art** *EPIC*-II*B* ™ **BiCMOS Design Significantly Reduces Power Dissipation**

- **Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17**

- **ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)**

- **Typical V_{OLP} (Output Ground Bounce) < 1 V at V_{CC} = 5 V, T_A = 25°C**

- **High-Drive Outputs (–32-mA I_{OH}, 64-mA I_{OL})**

- **Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB), and Thin Shrink Small-Outline (PW) Packages, Ceramic Chip Carriers (FK), and Plastic (N) and Ceramic (J) DIPs, and Ceramic Flat (W) Packages**

SN54ABT244A . . . J OR W PACKAGE
SN74ABT244A . . . DB, DW, N, OR PW PACKAGE
(TOP VIEW)

1OE	1	20	V_{CC}
1A1	2	19	2OE
2Y4	3	18	1Y1
1A2	4	17	2A4
2Y3	5	16	1Y2
1A3	6	15	2A3
2Y2	7	14	1Y3
1A4	8	13	2A2
2Y1	9	12	1Y4
GND	10	11	2A1

SN54ABT244A . . . FK PACKAGE
(TOP VIEW)

description

These octal buffers and line drivers are designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. Together with the 'ABT240A and 'ABT241A, these devices provide the choice of selected combinations of inverting and noninverting outputs, symmetrical active-low output-enable (OE) inputs, and complementary OE and OE inputs.

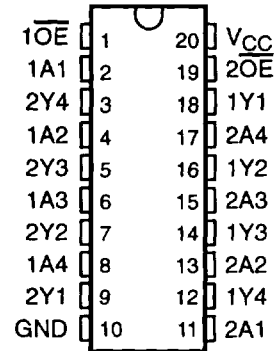The 'ABT244A are organized as two 4-bit buffers/line drivers with separate OE inputs. When OE is low, the devices pass data from the A inputs to the Y outputs. When OE is high, the outputs are in the high-impedance state.

To ensure the high-impedance state during power up or power down, OE should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.
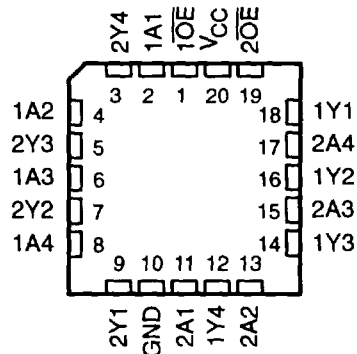
The SN74ABT244A is available in TI's shrink small-outline package (DB), which provides the same I/O pin count and functionality of standard small-outline packages in less than half the printed-circuit-board area.

The SN54ABT244A is characterized for operation over the full military temperature range of –55°C to 125°C. The SN74ABT244A is characterized for operation from –40°C to 85°C.

EPIC-IIB is a trademark of Texas Instruments Incorporated.

FUNCTION TABLE
(each buffer)

INPUTS		OUTPUT
OE	A	Y
L	H	H
L	L	L
H	X	Z

logic symbol†

† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, V_{CC} .... −0.5 V to 7 V

Input voltage range, V_I (see Note 1) .... −0.5 V to 7 V

Voltage applied to any output in the high state or power-off state, V_O .... −0.5 V to 5.5 V

Current into any output in the low state, I_O: SN54ABT244A .... 96 mA
SN74ABT244A .... 128 mA

Input clamp current, I_{IK} ($V_I < 0$) .... −18 mA

Output clamp current, I_{OK} ($V_O < 0$) .... −50 mA

Maximum power dissipation at T_A = 55°C (in still air) (see Note 2): DB package .... 0.6 W
DW package .... 1.6 W
N package .... 1.3 W
PW package .... 0.7 W

Storage temperature range, T_{stg} .... −65°C to 150°C

† Stresses beyond those listed under "absolute maximum ratings" 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.

NOTES: 1. The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
2. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils, except for the N package, which has a trace length of zero. For more information, refer to the *Package Thermal Considerations* application note in the *ABT Advanced BiCMOS Technology Data Book*.

recommended operating conditions (see Note 3)

		SN54ABT244A		SN74ABT244A		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage	4.5	5.5	4.5	5.5	V
V_{IH}	High-level input voltage	2		2		V
V_{IL}	Low-level input voltage		0.8		0.8	V
V_I	Input voltage	0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current		−24		−32	mA
I_{OL}	Low-level output current		48		64	mA
Δt/Δv	Input transition rise or fall rate		5		5	ns/V
T_A	Operating free-air temperature	−55	125	−40	85	°C

NOTE 3: Unused inputs must be held high or low to prevent them from floating.

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS			$T_A = 25°C$ MIN	TYP†	MAX	SN54ABT244A MIN	MAX	SN74ABT244A MIN	MAX	UNIT
V_{IK}	$V_{CC} = 4.5$ V,	$I_I = -18$ mA				-1.2		-1.2		-1.2	V
V_{OH}	$V_{CC} = 4.5$ V,	$I_{OH} = -3$ mA		2.5			2.5		2.5		V
	$V_{CC} = 5$ V,	$I_{OH} = -3$ mA		3			3		3		
	$V_{CC} = 4.5$ V	$I_{OH} = -24$ mA		2			2				
		$I_{OH} = -32$ mA		2*					2		
V_{OL}	$V_{CC} = 4.5$ V	$I_{OL} = 48$ mA				0.55		0.55			V
		$I_{OL} = 64$ mA				0.55*				0.55	
I_I	$V_{CC} = 5.5$ V,	$V_I = V_{CC}$ or GND				±1		±1		±1	µA
I_{OZH}	$V_{CC} = 5.5$ V,	$V_O = 2.7$ V				10		10		10	µA
I_{OZL}	$V_{CC} = 5.5$ V,	$V_O = 0.5$ V				-10		-10		-10	µA
I_{off}	$V_{CC} = 0$,	V_I or $V_O \le 4.5$ V				±100				±100	µA
I_{CEX}	$V_{CC} = 5.5$ V,	$V_O = 5.5$ V	Outputs high			50		50		50	µA
I_O‡	$V_{CC} = 5.5$ V,	$V_O = 2.5$ V		-50	-100	-180	-50	-180	-50	-180	mA
I_{CC}	$V_{CC} = 5.5$ V, $I_O = 0$, $V_I = V_{CC}$ or GND		Outputs high		1	250		250		250	µA
			Outputs low		24	30		30		30	mA
			Outputs disabled		0.5	250		250		250	µA
ΔI_{CC}§	$V_{CC} = 5.5$ V, One input at 3.4 V, Other inputs at V_{CC} or GND	Data inputs	Outputs enabled			1.5		1.5		1.5	mA
			Outputs disabled			0.05		0.05		0.05	
		Control inputs				1.5		1.5		1.5	
C_i	$V_I = 2.5$ V or 0.5 V				3.5						pF
C_o	$V_O = 2.5$ V or 0.5 V				4.5						pF

* On products compliant to MIL-PRF-38535, this parameter does not apply.
† All typical values are at $V_{CC} = 5$ V.
‡ Not more than one output should be tested at a time, and the duration of the test should not exceed one second.
§ This is the increase in supply current for each input that is at the specified TTL voltage level rather than V_{CC} or GND.

switching characteristics over recommended ranges of supply voltage and operating free-air temperature, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, T_A = 25°C			SN54ABT244A		UNIT
			MIN	TYP	MAX	MIN	MAX	
t_{PLH}	A	Y	1	2.6	4.1	1	5.3	ns
t_{PHL}			1	2.9	4.2	1	5	
t_{PZH}	$\overline{OE}$	Y	1.1	3.1	4.6	0.8	5.7	ns
t_{PZL}			2.1	4.1	5.6	1.2	7.9	
t_{PHZ}	$\overline{OE}$	Y	2.1	4.1	5.6	1.2	7.6	ns
t_{PLZ}			1.5	3.7	5.6	1	7.9	

switching characteristics over recommended ranges of supply voltage and operating free-air temperature, C_L = 50 pF (unless otherwise noted) (see Figure 1)
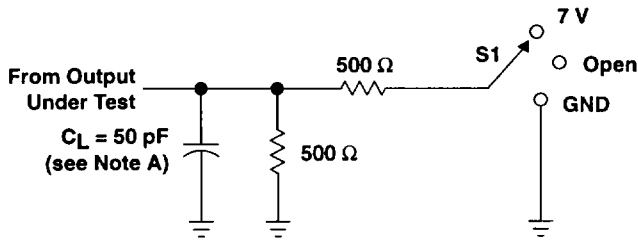
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, T_A = 25°C			SN74ABT244A		UNIT
			MIN	TYP	MAX	MIN	MAX	
t_{PLH}	A	Y	1	2.6	4.1	1	4.6	ns
t_{PHL}			1	2.9	4.3	1	4.6	
t_{PZH}	$\overline{OE}$	Y	1.1	3.1	4.6	1.1	5.1	ns
t_{PZL}			2.1	4.1	5.6	2.1	6.1	
t_{PHZ}	$\overline{OE}$	Y	1.8	4.1	5.6	1.8	6.6	ns
t_{PLZ}			1.4	3.7	5.2	1.4	5.7	

PARAMETER MEASUREMENT INFORMATION

LOAD CIRCUIT

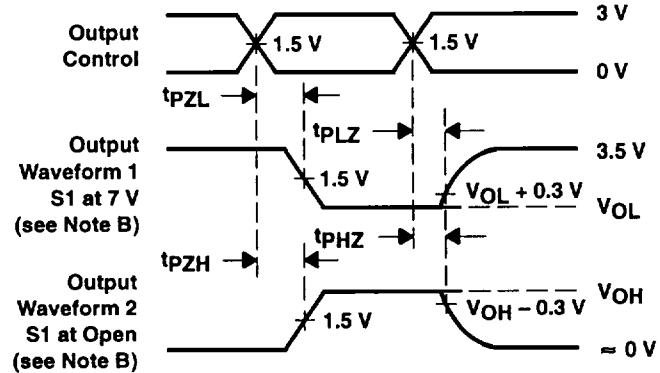| TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open
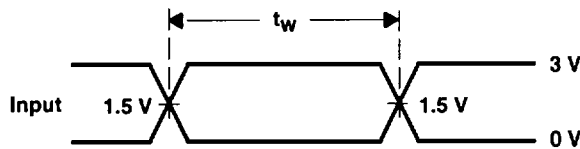
**VOLTAGE WAVEFORMS
PULSE DURATION**
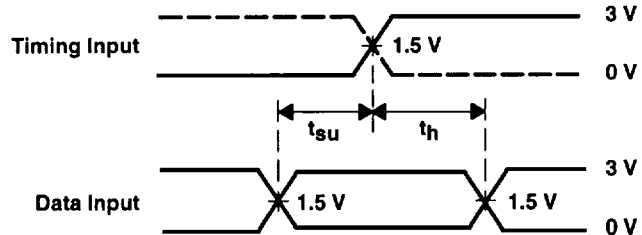
**VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES**
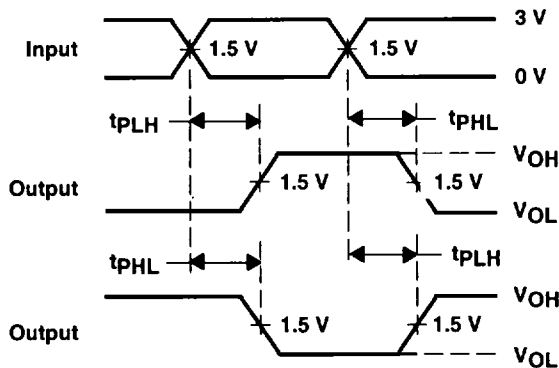
**VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS**

**VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES
LOW- AND HIGH-LEVEL ENABLING**

NOTES: A. C_L includes probe and jig capacitance.
      B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control.
         Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
      C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r ≤ 2.5 ns, t_f ≤ 2.5 ns.
      D. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

TEXAS
INSTRUMENTS

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