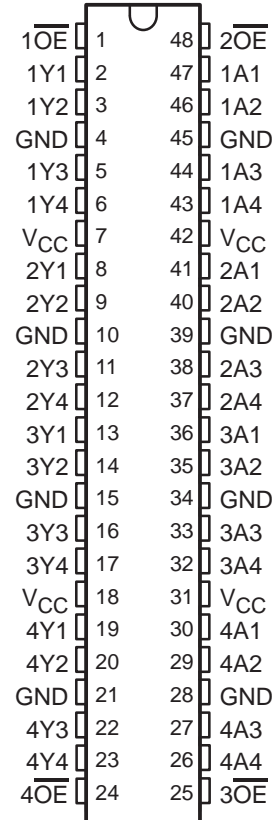


SN54ABT16244, SN74ABT16244A 16-BIT BUFFERS/DRIVERS WITH 3-STATE OUTPUTS

SCBS073G – SEPTEMBER 1991 – REVISED MAY 1997

- Members of the Texas Instruments *Widebus™* Family
- State-of-the-Art *EPIC-II B™* BiCMOS Design Significantly Reduces Power Dissipation
- Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17
- Typical V_{OLP} (Output Ground Bounce) < 1 V at $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$
- Distributed V_{CC} and GND Pin Configuration Minimizes High-Speed Switching Noise
- Flow-Through Architecture Optimizes PCB Layout
- High-Drive Outputs (-32 -mA I_{OH} , 64 -mA I_{OL})
- Package Options Include Plastic 300-mil Shrink Small-Outline (DL), Thin Shrink Small-Outline (DGG), and Thin Very Small-Outline (DGV) Packages and 380-mil Fine-Pitch Ceramic Flat (WD) Package Using 25-mil Center-to-Center Spacings

SN54ABT16244 . . . WD PACKAGE
SN74ABT16244A . . . DGG, DGV, OR DL PACKAGE
(TOP VIEW)



description

The SN54ABT16244 and SN74ABT16244A are 16-bit buffers and line drivers designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. These devices can be used as four 4-bit buffers, two 8-bit buffers, or one 16-bit buffer. These devices provide true outputs and symmetrical \overline{OE} (active-low output-enable) inputs.

To ensure the high-impedance state during power up or power down, \overline{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 SN54ABT16244 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ABT16244A is characterized for operation from -40°C to 85°C .

FUNCTION TABLE
(each buffer)

INPUTS		OUTPUT
\overline{OE}	A	Y
L	H	H
L	L	L
H	X	Z



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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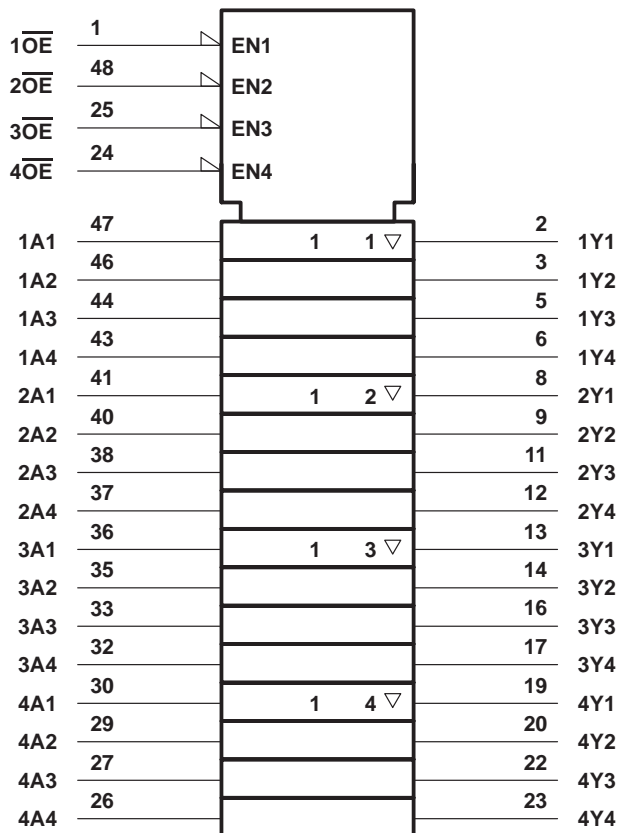
SN54ABT16244, SN74ABT16244A

16-BIT BUFFERS/DRIVERS

WITH 3-STATE OUTPUTS

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logic symbol†



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

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16-BIT BUFFERS/DRIVERS

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recommended operating conditions (see Note 3)

		SN54ABT16244		SN74ABT16244A		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
$\Delta t/\Delta v$	Input transition rise or fall rate	Outputs enabled		10	10	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	$T_A = 25^\circ\text{C}^\dagger$			SN54ABT16244		SN74ABT16244A		UNIT	
		MIN	TYP [‡]	MAX	MIN	MAX	MIN	MAX		
V_{IK}	$V_{CC} = 4.5\text{ V}$, $I_I = -18\text{ mA}$			-1.2		-1.2		-1.2	V	
V_{OH}	$V_{CC} = 4.5\text{ V}$, $I_{OH} = -3\text{ mA}$		2.5		2.5		2.5		V	
	$V_{CC} = 5\text{ V}$, $I_{OH} = -3\text{ mA}$		3		3		3			
	$V_{CC} = 4.5\text{ V}$	$I_{OH} = -24\text{ mA}$		2		2				
		$I_{OH} = -32\text{ mA}$		2*				2		
V_{OL}	$V_{CC} = 4.5\text{ V}$	$I_{OL} = 48\text{ mA}$		0.55		0.55			V	
		$I_{OL} = 64\text{ mA}$		0.55*				0.55		
V_{hys}			100						mV	
I_I	$V_{CC} = 5.5\text{ V}$, $V_I = V_{CC}$ or GND			± 1		± 1		± 1	μA	
I_{OZH}	$V_{CC} = 5.5\text{ V}$, $V_O = 2.7\text{ V}$			10^\S		10		10^\S	μA	
I_{OZL}	$V_{CC} = 5.5\text{ V}$, $V_O = 0.5\text{ V}$			-10^\S		-10		-10^\S	μA	
I_{off}	$V_{CC} = 0$, V_I or $V_O \leq 4.5\text{ V}$			± 100				± 100	μA	
I_{CEX}	$V_{CC} = 5.5\text{ V}$, $V_O = 5.5\text{ V}$	Outputs high		50		50		50	μA	
$I_{O\ddagger}$	$V_{CC} = 5.5\text{ V}$, $V_O = 2.5\text{ V}$	-50	-100	-180	-50	-180	-50	-180	mA	
I_{CC}	$V_{CC} = 5.5\text{ V}$, $I_O = 0$, $V_I = V_{CC}$ or GND	Outputs high		3		2		3	mA	
		Outputs low		32		32		32		
		Outputs disabled		3		2		3		
$\Delta I_{CC}^\#$	Data inputs	$V_{CC} = 5.5\text{ V}$, One input at 3.4 V, Other inputs at V_{CC} or GND	Outputs enabled		0.05		1.5		0.05	mA
			Outputs disabled		0.05		1		0.05	
	Control inputs	$V_{CC} = 5.5\text{ V}$, One input at 3.4 V, Other inputs at V_{CC} or GND			0.05		1.5		0.05	
C_i	$V_I = 2.5\text{ V}$ or 0.5 V			3					pF	
C_o	$V_O = 2.5\text{ V}$ or 0.5 V			8					pF	

* On products compliant to MIL-PRF-38535, this parameter does not apply.

† Characteristics for $T_A = 25^\circ\text{C}$ apply to the SN74ABT16244A only.

‡ All typical values are at $V_{CC} = 5\text{ V}$.

§ This data sheet limit may vary among suppliers.

¶ 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.



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16-BIT BUFFERS/DRIVERS
WITH 3-STATE OUTPUTS

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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)	SN54ABT16244				UNIT	
			$V_{CC} = 5$ V, $T_A = 25^\circ$ C			MIN		MAX
			MIN	TYP	MAX			
t_{PLH}	A	Y	0.7	2.3	3.2	0.7	3.6	ns
t_{PHL}			0.5	2.6	3.7	0.5	4.2	
t_{PZH}	\overline{OE}	Y	0.7	3	4	0.7	4.9	ns
t_{PZL}			0.9	3.2	5.5	0.9	6.5	
t_{PHZ}	\overline{OE}	Y	1.7	3.6	5	1.7	6	ns
t_{PLZ}			1.5	2.9	4.7	1.5	5.7	

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)	SN74ABT16244A				UNIT	
			$V_{CC} = 5$ V, $T_A = 25^\circ$ C			MIN		MAX
			MIN	TYP	MAX			
t_{PLH}	A	Y	1	2.3	3.2	1	3.5	ns
t_{PHL}			1	2.6	3.7	1	4.1	
t_{PZH}	\overline{OE}	Y	1	3	3.8	1	4.8	ns
t_{PZL}			1	3.2	4	1	4.8	
t_{PHZ}	\overline{OE}	Y	1	3.6	4.4	1	4.8	ns
t_{PLZ}			1	2.9	3.7	1	4.1	

SN54ABT16244, SN74ABT16244A
16-BIT BUFFERS/DRIVERS
WITH 3-STATE OUTPUTS

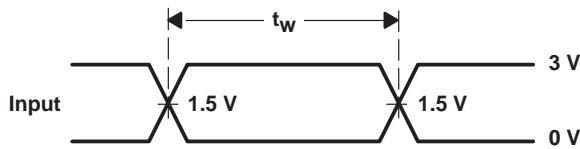
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PARAMETER MEASUREMENT INFORMATION

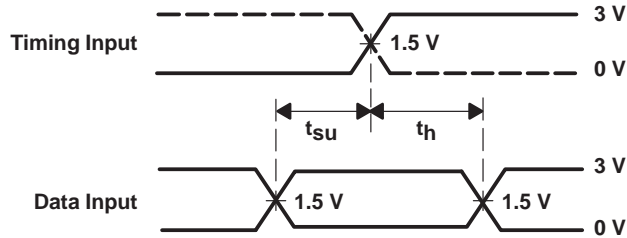


LOAD CIRCUIT

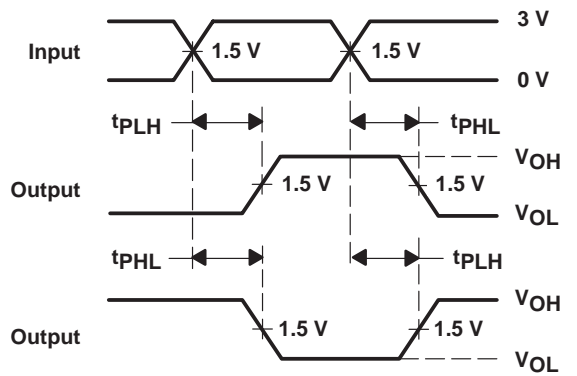
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open



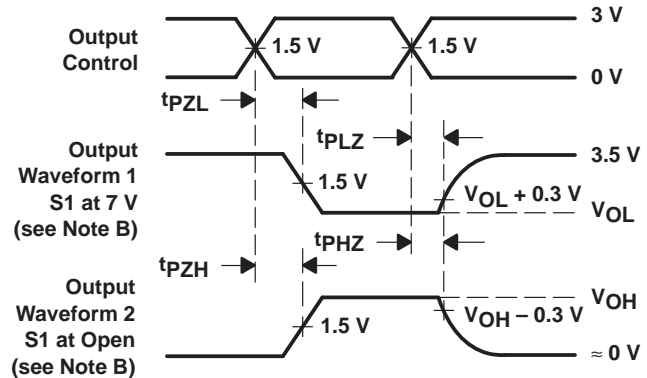
**VOLTAGE WAVEFORMS
 PULSE DURATION**



**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: $PRR \leq 10 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r \leq 2.5 \text{ ns}$, $t_f \leq 2.5 \text{ ns}$.
 D. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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