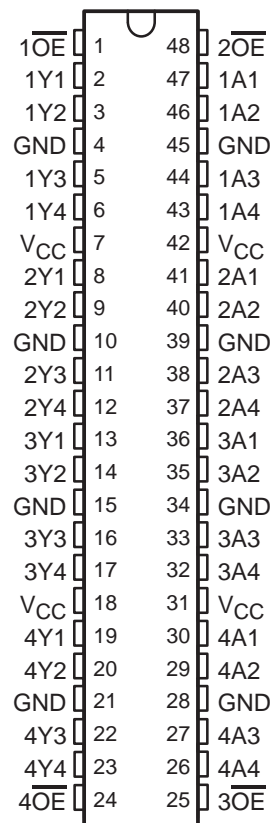


SN54ABT162244, SN74ABT162244 16-BIT BUFFERS/DRIVERS WITH 3-STATE OUTPUTS

SCBS238D – JUNE 1992 – REVISED MAY 1997

- Members of the Texas Instruments *Widebus*™ Family
- Output Ports Have Equivalent 25-Ω Series Resistors, So No External Resistors Are Required
- 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, $T_A = 25^\circ\text{C}$
- High-Impedance State During Power Up and Power Down
- Distributed V_{CC} and GND Pin Configuration Minimizes High-Speed Switching Noise
- Flow-Through Architecture Optimizes PCB Layout
- 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

SN54ABT162244 . . . WD PACKAGE
SN74ABT162244 . . . DGG, DGV, OR DL PACKAGE
(TOP VIEW)



description

The 'ABT162244 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 noninverting outputs and symmetrical active-low output-enable (\overline{OE}) inputs.

The outputs, which are designed to source or sink up to 12 mA, include equivalent 25-Ω series resistors to reduce overshoot and undershoot.

When V_{CC} is between 0 and 2.1 V, the device is in the high-impedance state during power up or power down. However, to ensure the high-impedance state above 2.1 V, \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 SN54ABT162244 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ABT162244 is characterized for operation from -40°C to 85°C .



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.

**TEXAS
INSTRUMENTS**

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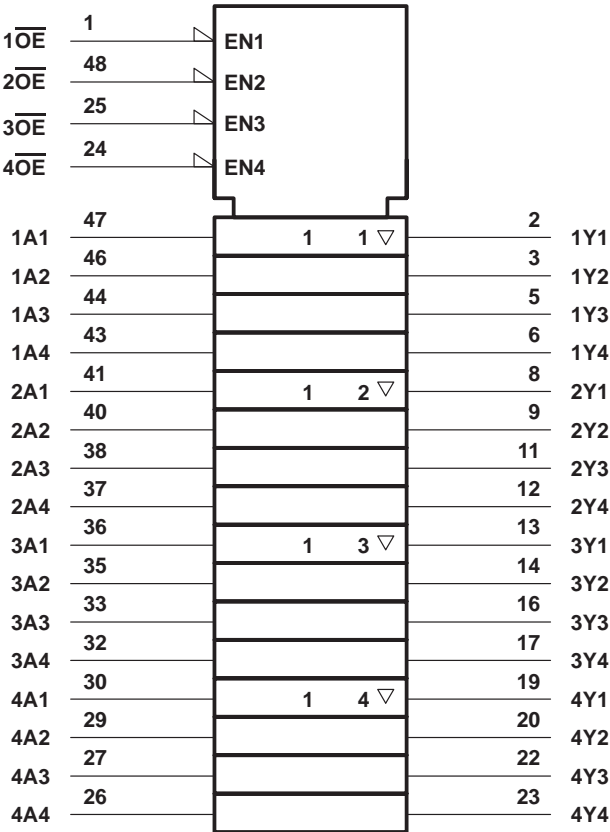
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SN54ABT162244, SN74ABT162244
16-BIT BUFFERS/DRIVERS
WITH 3-STATE OUTPUTS
SCBS238D – JUNE 1992 – REVISED MAY 1997

FUNCTION TABLE
(each 4-bit buffer)

INPUTS		OUTPUT Y
\overline{OE}	A	
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.

recommended operating conditions (see Note 3)

			SN54ABT162244		SN74ABT162244		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			-12		-12	mA
I_{OL}	Low-level output current			12		12	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	Outputs enabled		10		10	ns/V
$\Delta t/\Delta V_{CC}$	Power-up ramp rate		200		200		$\mu s/V$
T_A	Operating free-air temperature		-55	125	-40	85	$^{\circ}C$

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			SN54ABT162244		SN74ABT162244		UNIT
				MIN	TYP†	MAX	MIN	MAX	MIN	MAX	
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} = −1 mA		3.35			3.35		3.35		V
		V _{CC} = 5 V, I _{OH} = −1 mA		3.85			3.85		3.85		
		V _{CC} = 4.5 V	I _{OH} = −3 mA	3.1		3.1		3.1			
			I _{OH} = −12 mA	2.6*				2.6			
V _{OL}		V _{CC} = 4.5 V	I _{OL} = 8 mA	0.4 0.8		0.8		0.65		V	
			I _{OL} = 12 mA					0.8			
V _{hys}				100							mV
I _I		V _{CC} = 0 to 5.5 V, V _I = V _{CC} or GND		±1			±1		±1		μA
I _{OZPU} ‡		V _{CC} = 0 to 2.1 V, V _O = 0.5 V to 2.7 V, \overline{OE} = X		±50			±50		±50		μA
I _{OZPD} ‡		V _{CC} = 2.1 V to 0, V _O = 0.5 V to 2.7 V, \overline{OE} = X		±50			±50		±50		μA
I _{OZH}		V _{CC} = 2.1 V to 5.5 V, V _O = 2.7 V, $\overline{OE} \geq 2$ V		10			10		10		μA
I _{OZL}		V _{CC} = 2.1 V to 5.5 V, V _O = 0.5 V, $\overline{OE} \geq 2$ V		−10			−10		−10		μA
I _{off}		V _{CC} = 0, V _I or V _O ≤ 4.5 V		±100					±100		μA
I _{CEX}		V _{CC} = 5.5 V, V _O = 5.5 V	Oupputs high	50			50		50		μA
I _O §		V _{CC} = 5.5 V, V _O = 2.5 V		−25	−55	−100	−25	−100	−25	−100	mA
I _{CC}		V _{CC} = 5.5 V, I _O = 0, V _I = V _{CC} or GND	Outputs high	2			2		2		mA
			Outputs low	30			30		30		
			Outputs disabled	2			2		2		
ΔI _{CC} ¶	Data inputs	V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND	Outputs enabled	50			50		50		μA
			Outputs disabled	50			50		50		
	Control inputs	V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND		50			50		50		
C _i		V _I = 2.5 V or 0.5 V		3							pF
C _O		V _O = 2.5 V or 0.5 V		8							pF

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

† All typical values are at V_{CC} = 5 V.

‡ This parameter is characterized, but not production tested.

§ 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.

SN54ABT162244, SN74ABT162244

16-BIT BUFFERS/DRIVERS

WITH 3-STATE OUTPUTS

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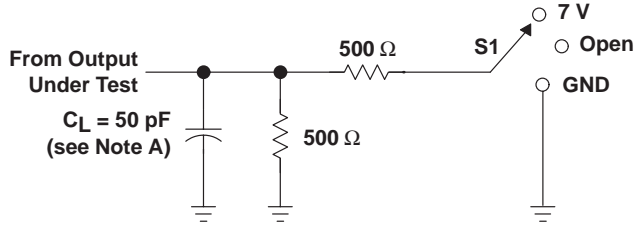
switching characteristics over recommended ranges of supply voltage and operating free-air temperature, $C_L = 50$ pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54ABT162244					UNIT
			V _{CC} = 5 V, T _A = 25°C			MIN	MAX	
			MIN	TYP	MAX			
t _{PLH}	A	Y	1	2.5	3.6	1	4.1	ns
t _{PHL}			1	3.1	4.7	1	5.3	
t _{PZH}	OE	Y	1	3.2	4.8	1	5.6	ns
t _{PZL}			1	3.2	4.7	1	5.5	
t _{PHZ}	OE	Y	1	3.2	5.3	1	6.3	ns
t _{PLZ}			1	3.1	4.6	1	4.9	

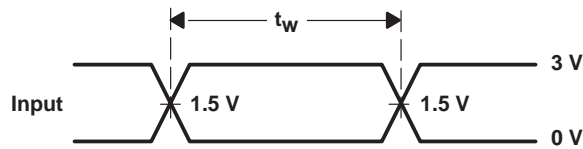
switching characteristics over recommended ranges of supply voltage and operating free-air temperature, $C_L = 50$ pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN74ABT162244					UNIT
			V _{CC} = 5 V, T _A = 25°C			MIN	MAX	
			MIN	TYP	MAX			
t _{PLH}	A	Y	1	2.5	3.2	1	3.9	ns
t _{PHL}			1	3.1	4	1	4.8	
t _{PZH}	OE	Y	1	3.2	4.2	1	5.4	ns
t _{PZL}			1	3.2	4.1	1	5.1	
t _{PHZ}	OE	Y	1	3.2	4	1	4.6	ns
t _{PLZ}			1	3.1	3.9	1	4.5	

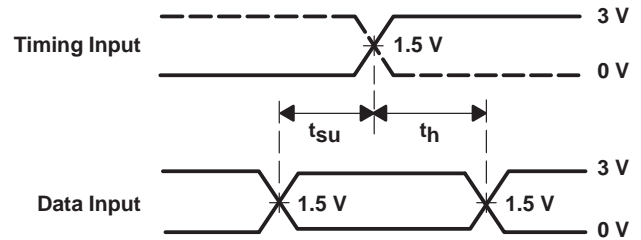
PARAMETER MEASUREMENT INFORMATION



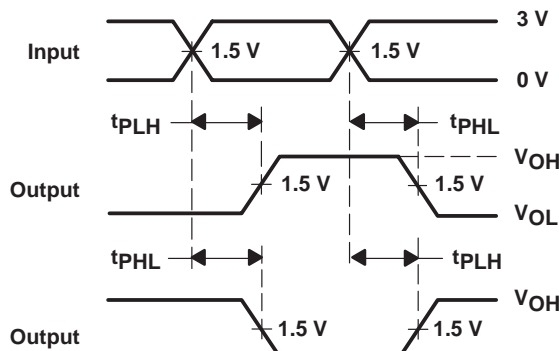
LOAD CIRCUIT



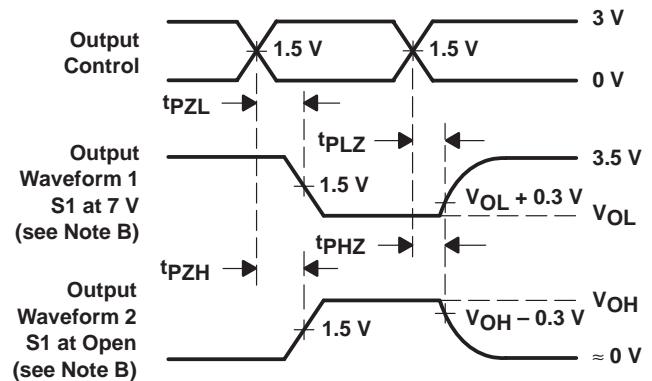
VOLTAGE WAVEFORMS
PULSE DURATION



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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