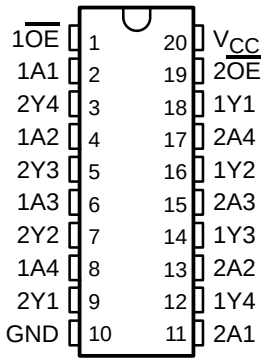
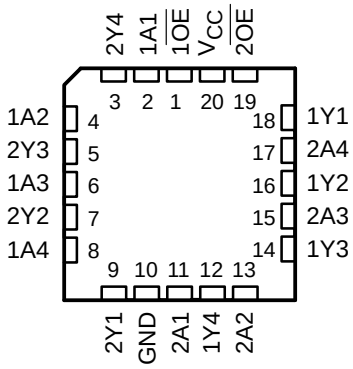
- **Output Ports Have Equivalent 25-Ω Series Resistors, So No External Resistors Are Required**
- **State-of-the-Art *EPIC*-II*B*™ BiCMOS Design Significantly Reduces Power Dissipation**
- **Typical V_{OLP} (Output Ground Bounce) < 1 V at V_{CC} = 5 V, T_A = 25°C**
- **Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17**
- **ESD Protection Exceeds 2000 V Per MIL-STD-883, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)**
- **Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB), and Thin Shrink Small-Outline (PW) Packages, Ceramic Chip Carriers (FK), Plastic (N) and Ceramic (J) DIPs, and Ceramic Flat (W) Package**

SN54ABT2240 . . . J OR W PACKAGE
SN74ABT2240A . . . DB, DW, N, OR PW PACKAGE
(TOP VIEW)



SN54ABT2240 . . . 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 ’ABT2241 and ’ABT2244A, these devices provide combinations of inverting and noninverting outputs, symmetrical active-low output-enable ($\overline{OE}$) inputs, and complementary OE and $\overline{OE}$ inputs. These devices feature high fan-out and improved fan-in.

These devices are organized as two 4-bit line drivers with separate $\overline{OE}$ inputs. When $\overline{OE}$ is low, the devices pass inverted data from the A inputs to the Y outputs. When $\overline{OE}$ is high, the outputs are in the high-impedance state.

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

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 SN54ABT2240 is characterized for operation over the full military temperature range of –55°C to 125°C. The SN74ABT2240A 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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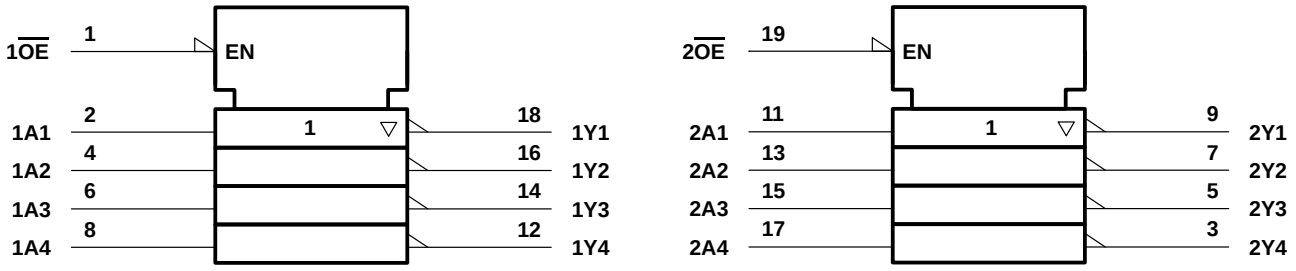
FUNCTION TABLE
(each buffer)

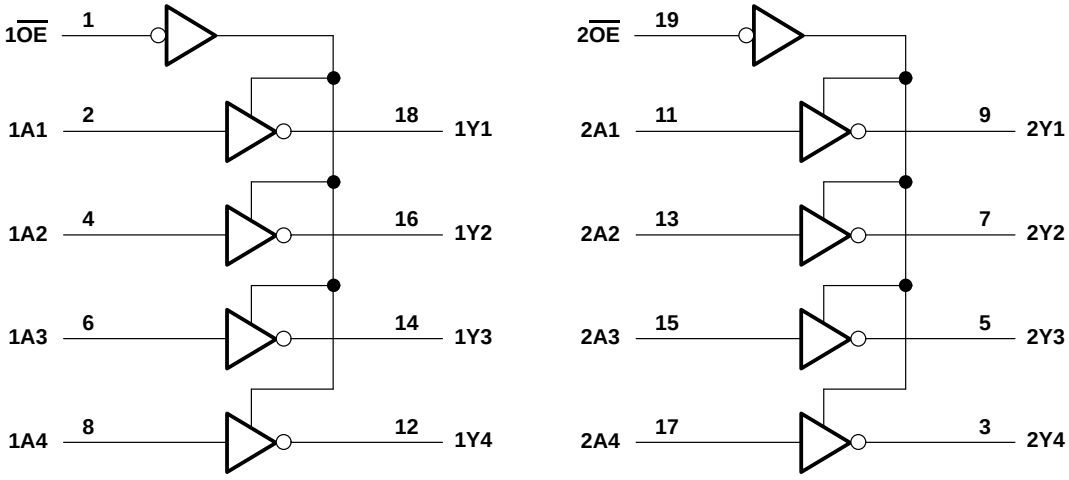
INPUTS		OUTPUT
$\overline{OE}$	A	Y
L	H	L
L	L	H
H	X	Z

logic symbol†

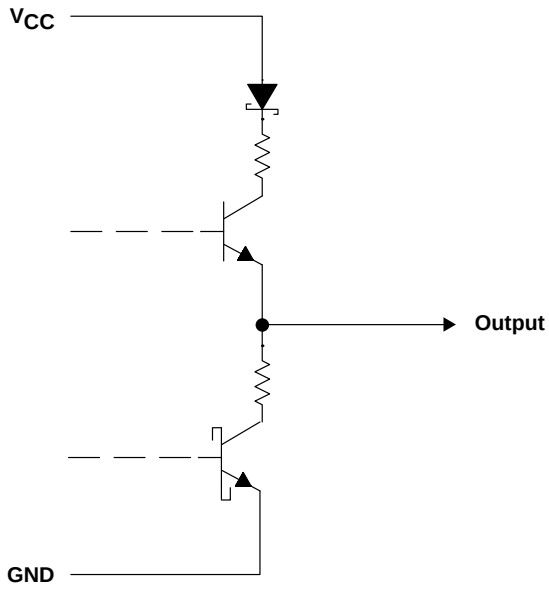


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



schematic of Y outputs



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 range applied to any output in the high or power-off state, V_O . . . . . –0.5 V to 5.5 V
Current into any output in the low state, I_O . . . . . 30 mA
Input clamp current, I_{IK} (V_I < 0) . . . . . –18 mA
Output clamp current, I_{OK} (V_O < 0) . . . . . –50 mA
Package thermal impedance, θ_{JA} (see Note 2): DB package . . . . . 115°C/W
DW package . . . . . 97°C/W
N package . . . . . 67°C/W
PW package . . . . . 128°C/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 package thermal impedance is calculated in accordance with EIA/JEDEC Std JESD51, except for through-hole packages, which use a trace length of zero.

recommended operating conditions (see Note 3)

			SN54ABT2240		SN74ABT2240A		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			12		12	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	Outputs enabled		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			SN54ABT2240		SN74ABT2240A		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} = –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} = 12 mA			0.8		0.8		0.8	V
V_{hys}					100						mV
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}§	Data inputs	V_{CC} = 5.5 V, One input at 3.4 V, Other inputs at V_{CC} or GND	Outputs enabled			1.5		1.5		1.5	mA
			Outputs disabled			0.05		0.05		0.05	
	Control inputs	V_{CC} = 5.5 V, One input at 3.4 V, Other inputs at V_{CC} or GND				1.5		1.5		1.5	
C_i		V_I = 2.5 V or 0.5 V			4						pF
C_o		V_O = 2.5 V or 0.5 V			7						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.

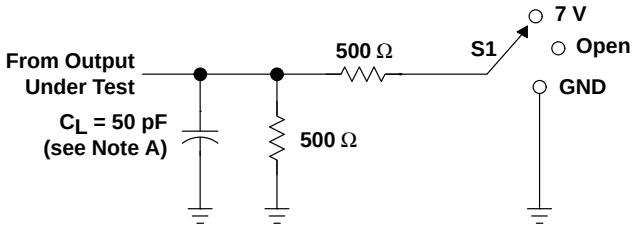
switching characteristics over recommended ranges of supply voltage and operating free-air temperature, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54ABT2240					UNIT
			V_{CC} = 5 V, T_A = 25°C			MIN	MAX	
			MIN	TYP	MAX			
t_{PLH}	A	Y	1	3	4	1	5	ns
t_{PHL}			3	4.8	5.8	3	6.3	
t_{PZH}	$\overline{OE}$	Y	1.5	3.7	4.7	1.5	6.1	ns
t_{PZL}			4.2	6.5	7.6	4.2	8.8	
t_{PHZ}	$\overline{OE}$	Y	1.9	3.8	5.6	1.9	6.2	ns
t_{PLZ}			2.5	4.7	5.8	2.5	6.9	

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

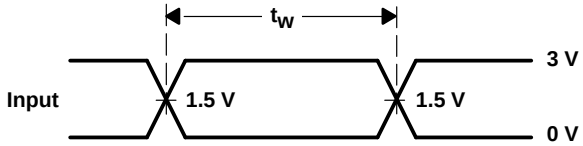
PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN74ABT2240A					UNIT
			V_{CC} = 5 V, T_A = 25°C			MIN	MAX	
			MIN	TYP	MAX			
t_{PLH}	A	Y	1	3	4.1	1	4.8	ns
t_{PHL}			2.1	4.1	5.1	2.1	5.4	
t_{PZH}	$\overline{OE}$	Y	1.1	3.1	4.7	1.1	5.2	ns
t_{PZL}			1.7	4.5	6.4	1.7	6.8	
t_{PHZ}	$\overline{OE}$	Y	1.8	3.4	5.7	1.8	6.4	ns
t_{PLZ}			1.9	3.6	6	1.9	6.2	

PARAMETER MEASUREMENT INFORMATION

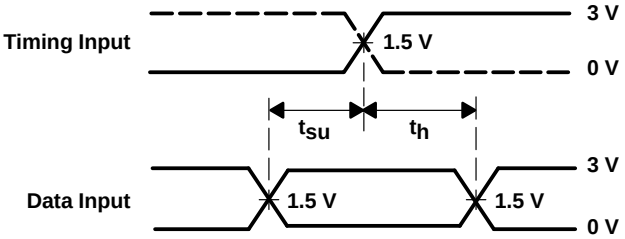


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open

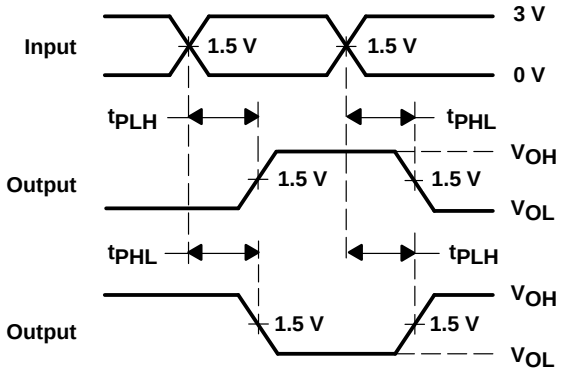
LOAD CIRCUIT



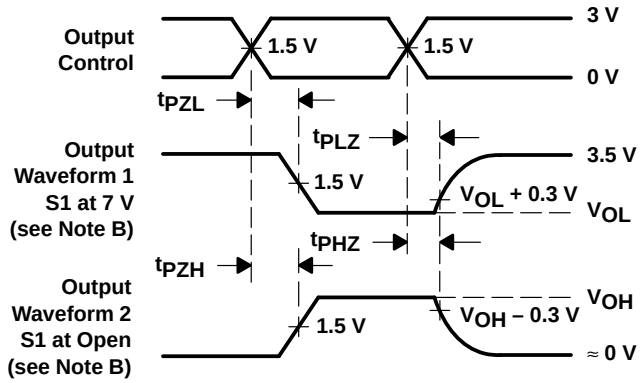
VOLTAGE WAVEFORMS
PULSE DURATION



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 ≤ 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

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