

Octal inverting buffer (3-State)

74ABT240

FEATURES

- Octal bus interface
- 3-State buffers
- Output capability: +64mA/−32mA
- 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
- Power-up 3-State
- Live insertion/extraction permitted

DESCRIPTION

The 74ABT240 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT240 device is an octal inverting buffer that is ideal for driving bus lines. The device features two Output Enables (1 \overline{OE} , 2 \overline{OE}), each controlling four of the 3-State outputs.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS $T_{amb} = 25^{\circ}\text{C}; \text{GND} = 0\text{V}$	TYPICAL	UNIT
t_{PLH} t_{PHL}	Propagation delay nAx to nYx	$C_L = 50\text{pF}; V_{CC} = 5\text{V}$	3.1	ns
C_{IN}	Input capacitance	$V_I = 0\text{V}$ or V_{CC}	4	pF
C_{OUT}	Output capacitance	Outputs disabled; $V_O = 0\text{V}$ or V_{CC}	7	pF
I_{CCZ}	Total supply current	Outputs disabled; $V_{CC} = 5.5\text{V}$	50	μA

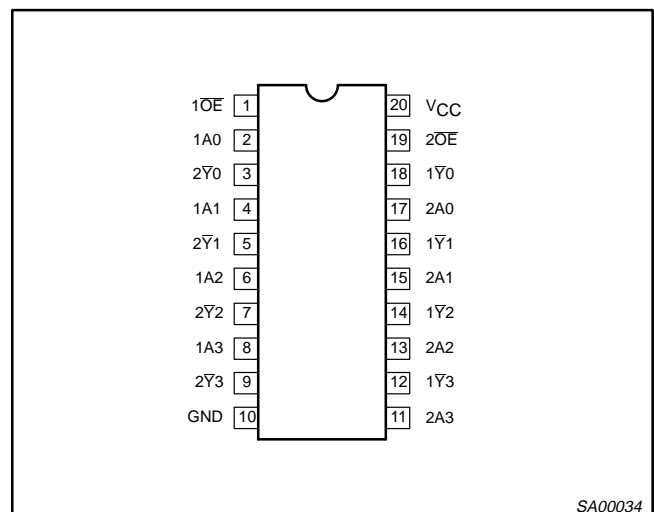
ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	NORTH AMERICA	DWG NUMBER
20-Pin Plastic DIP	−40°C to +85°C	74ABT240 N	74ABT240 N	SOT146-1
20-Pin plastic SO	−40°C to +85°C	74ABT240 D	74ABT240 D	SOT163-1
20-Pin Plastic SSOP Type II	−40°C to +85°C	74ABT240 DB	74ABT240 DB	SOT339-1
20-Pin Plastic TSSOP Type I	−40°C to +85°C	74ABT240 PW	74ABT240PW DH	SOT360-1

PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
2, 4, 6, 8	1A0 – 1A3	Data inputs
11, 13, 15, 17	2A0 – 2A3	Data inputs
18, 16, 14, 12	1Y0 – 1Y3	Data outputs
9, 7, 5, 3	2Y0 – 2Y3	Data outputs
1, 19	1 \overline{OE} , 2 \overline{OE}	Output enables
10	GND	Ground (0V)
20	V_{CC}	Positive supply voltage

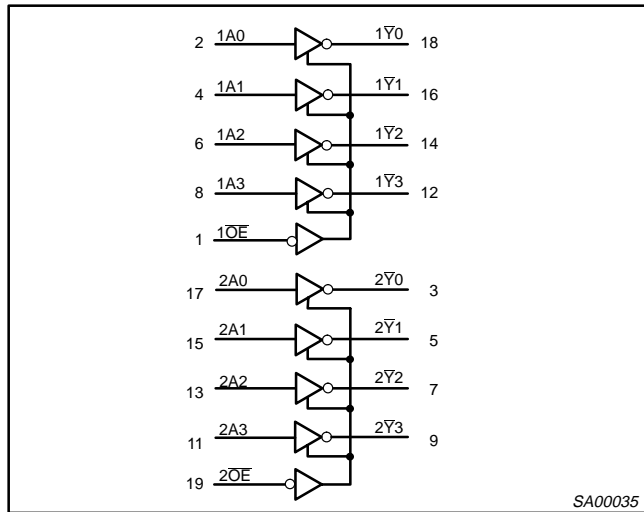
PIN CONFIGURATION



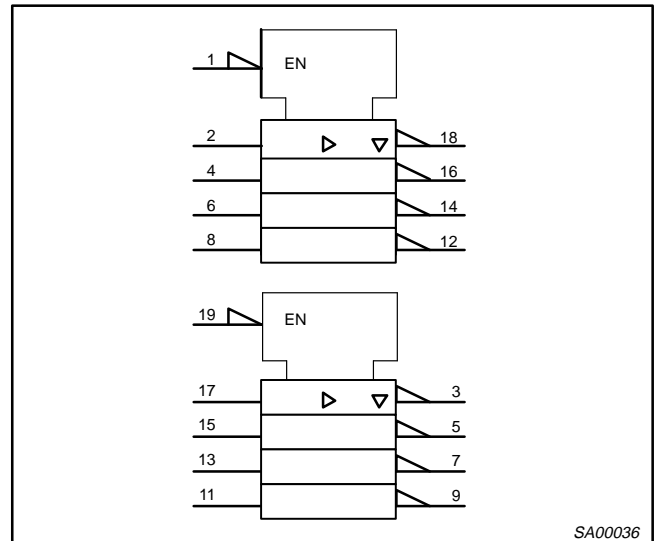
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LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



FUNCTION TABLE

INPUTS			OUTPUTS		
1OE	1An	2OE	2An	1Yn	2Yn
L	L	L	L	H	H
L	H	L	H	L	L
H	X	H	X	Z	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
T _{stg}	Storage temperature range		-65 to 150	°C

NOTES:

- 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.
- 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.
- The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

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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
			$T_{amb} = +25^{\circ}\text{C}$			$T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$		
			Min	Typ	Max	Min	Max	
V_{IK}	Input clamp voltage	$V_{CC} = 4.5\text{V}; I_{IK} = -18\text{mA}$		-0.9	-1.2		-1.2	V
V_{OH}	High-level output voltage	$V_{CC} = 4.5\text{V}; I_{OH} = -3\text{mA}; V_I = V_{IL}$ or V_{IH}	2.5	2.9		2.5		V
		$V_{CC} = 5.0\text{V}; I_{OH} = -3\text{mA}; V_I = V_{IL}$ or V_{IH}	3.0	3.4		3.0		V
		$V_{CC} = 4.5\text{V}; I_{OH} = -32\text{mA}; V_I = V_{IL}$ or V_{IH}	2.0	2.4		2.0		V
V_{OL}	Low-level output voltage	$V_{CC} = 4.5\text{V}; I_{OL} = 64\text{mA}; V_I = V_{IL}$ or V_{IH}		0.42	0.55		0.55	V
I_I	Input leakage current	$V_{CC} = 5.5\text{V}; V_I = \text{GND}$ or 5.5V		± 0.01	± 1.0		± 1.0	μA
I_{OFF}	Power-off leakage current	$V_{CC} = 0.0\text{V}; V_I$ or $V_O \leq 4.5\text{V};$		± 5.0	± 100		± 100	μA
I_{PU}/I_{PD}	Power-up/down 3-state output current ³	$V_{CC} = 2.1\text{V}; V_O = 0.5\text{V}; V_I = \text{GND}$ or $V_{CC}; V_{OE} = \text{Don't care}$		± 5.0	± 50		± 50	μA
I_{OZH}	3-State output High current	$V_{CC} = 5.5\text{V}; V_O = 2.7\text{V}; V_I = V_{IL}$ or V_{IH}		5.0	50		50	μA
I_{OZL}	3-State output Low current	$V_{CC} = 5.5\text{V}; V_O = 0.5\text{V}; V_I = V_{IL}$ or V_{IH}		-5.0	-50		-50	μA
I_{CEX}	Output High leakage current	$V_{CC} = 5.5\text{V}; V_O = 5.5\text{V}; V_I = \text{GND}$ or V_{CC}		5.0	50		50	μA
I_O	Output current ¹	$V_{CC} = 5.5\text{V}; V_O = 2.5\text{V}$	-50	-100	-180	-50	-180	mA
I_{CCH}	Quiescent supply current	$V_{CC} = 5.5\text{V}; \text{Outputs High}, V_I = \text{GND}$ or V_{CC}		50	250		250	μA
I_{CCL}		$V_{CC} = 5.5\text{V}; \text{Outputs Low}, V_I = \text{GND}$ or V_{CC}		24	30		30	mA
I_{CCZ}		$V_{CC} = 5.5\text{V}; \text{Outputs 3-State}; V_I = \text{GND}$ or V_{CC}		50	250		250	μA
ΔI_{CC}	Additional supply current per input pin ²	Outputs 3-State, one input at 3.4V, other inputs at V_{CC} or GND; $V_{CC} = 5.5\text{V}$		0.5	1.5		1.5	mA

NOTES:

- 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 at 3.4V.
- This parameter is valid for any V_{CC} between 0V and 2.1V, with a transition time of up to 10msec. From $V_{CC} = 2.1\text{V}$ to $V_{CC} 5\text{V} \pm 10\%$ a transition time of up to 100 μsec is permitted.

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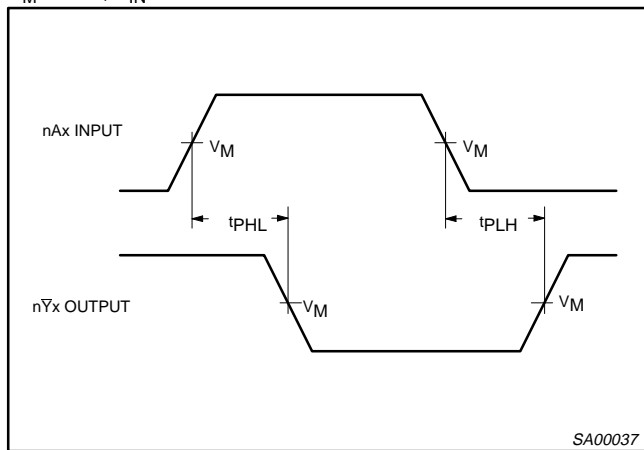
AC CHARACTERISTICS

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

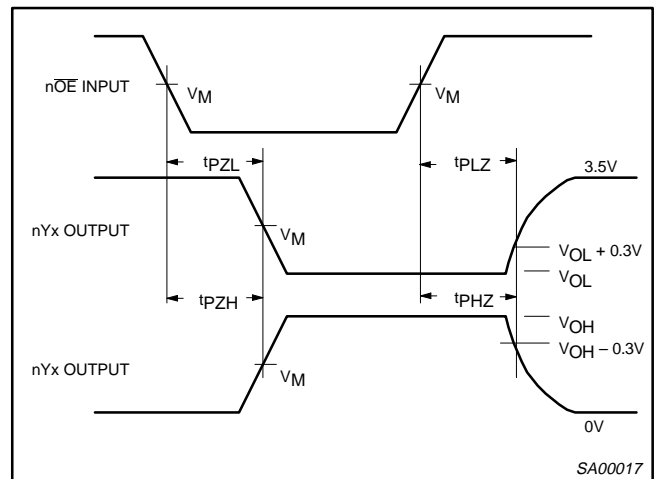
SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT
			$T_{\text{amb}} = +25^\circ\text{C}$ $V_{\text{CC}} = +5.0\text{V}$			$T_{\text{amb}} = -40^\circ\text{C to } +85^\circ\text{C}$ $V_{\text{CC}} = +5.0\text{V} \pm 0.5\text{V}$		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay nAx to nYx	1	1.0 1.6	2.7 3.5	4.1 4.3	1.0 1.6	4.8 4.8	ns
t_{PZH} t_{PZL}	Output enable time to High and Low level	2	1.1 1.1	3.1 4.2	4.7 5.8	1.1 1.1	5.2 6.2	ns
t_{PHZ} t_{PLZ}	Output disable time from High and Low level	2	1.8 1.6	3.7 3.0	5.7 5.4	1.8 1.6	6.4 5.8	ns

AC WAVEFORMS

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



Waveform 1. Waveforms Showing the Input (nAx) to Output (nYx) Propagation Delays

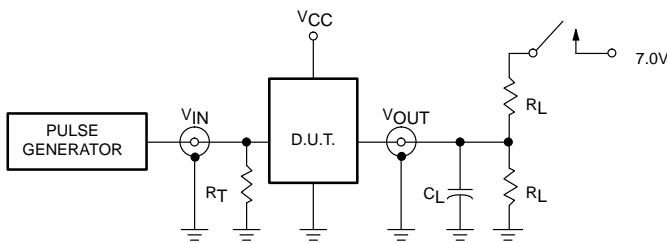


Waveform 2. Waveforms Showing the 3-State Output Enable and Disable Times

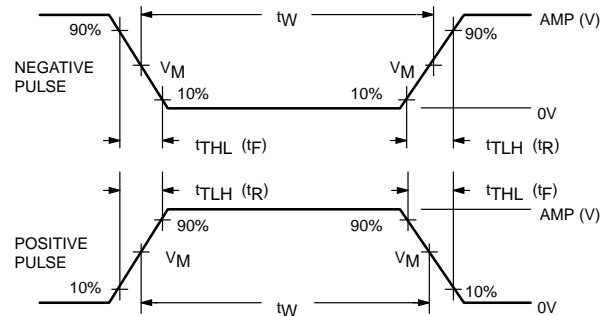
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TEST CIRCUIT AND WAVEFORMS



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	3.0V	1MHz	500ns	2.5ns	2.5ns

SA00012

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General description

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- Power-up 3-State
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Applications

[AN203_2: Test Fixtures for High Speed Logic](#) (date 02-Apr-98)

[AN2301: Simulation Support for Philips' Advanced BiCMOS Products](#)

Datasheet

<u>Type number</u>	<u>Title</u>	<u>Publication release date</u>	<u>Datasheet status</u>	<u>Page count</u>	<u>File size (kB)</u>	<u>Datasheet</u>
74ABT240	Octal inverting buffer (3-State)	9/10/1996	Product specification	5	43	Download

□ Parametrics

Type number	Package	Description	Propagation Delay(ns)	Voltage	No. of Pins	Power Dissipation Considerations	Logic Switching Levels	Output Drive Capability
74ABT240D	SOT163 (SO20)	Octal Buffer/Line Driver; Inverting (3-State)	4~6	5 Volts +	20	None	TTL	High
74ABT240DB	SOT339-1 (SSOP20)	Octal Buffer/Line Driver; Inverting (3-State)	4~6	5 Volts +	20	None	TTL	High
74ABT240N	SOT146-1 (DIP20)	Octal Buffer/Line Driver; Inverting (3-State)	4~6	5 Volts +	20	None	TTL	High
74ABT240PW	SOT360-1 (TSSOP20)	Octal Buffer/Line Driver; Inverting (3-State)	4~6	5 Volts +	20	None	TTL	High

□ Products, packages, availability and ordering

<u>Type number</u>	<u>North American type number</u>	<u>Ordering code (12NC)</u>	<u>Marking/Packing</u> IC packing info	<u>Package</u>	<u>Device status</u>	<u>Buy online</u>
74ABT240D	74ABT240D	9350 535 80602	Standard Marking * Tube (Signetics)	SOT163 (SO20)	Full production	order this <input type="checkbox"/>
	74ABT240D-T	9350 535 80623	Standard Marking * Reel Pack, SMD, 13" (Signetics)	SOT163 (SO20)	Full production	order this <input type="checkbox"/>
74ABT240DB	74ABT240DB	9350 663 80112	Standard Marking * Tube	SOT339-1 (SSOP20)	Full production	order this <input type="checkbox"/>
	74ABT240DB-T	9350 663 80118	Standard Marking * Reel Pack, SMD, 13"	SOT339-1 (SSOP20)	Full production	order this <input type="checkbox"/>
74ABT240N	74ABT240N	9350 535 90602	Standard Marking * Tube (Signetics)	SOT146-1 (DIP20)	Full production	order this <input type="checkbox"/>
74ABT240PW	74ABT240PW	9351 764 40112	Standard Marking * Tube	SOT360-1 (TSSOP20)	Full production	order this <input type="checkbox"/>
	74ABT240PW-T	9351 764 40118	Standard Marking * Reel Pack, SMD, 13"	SOT360-1 (TSSOP20)	Full production	order this <input type="checkbox"/>

Products in the above table are all in production. Some variants are discontinued; [click here](#) for information on these variants.

▣ Similar products

[74ABT240](#) links to the similar products page containing an overview of products that are similar in function or related to the type number(s) as listed on this page. The similar products page includes products from the same catalog tree(s), relevant selection guides and products from the same functional category.

▣ Support & tools

[ABT family characteristics, Family specifications](#)(date 01-Mar-98)

[Introduction to Advanced BiCMOS Logic Products](#)(date 01-Mar-98)

[Advanced BiCMOS features](#)(date 01-Jan-98)

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