

# DATA SHEET

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## 74ABT620

Octal transceiver with dual enable,  
inverting (3-State)

Product specification

1993 Jun 21

IC23 Data Handbook

# Octal transceiver with dual enable, inverting (3-State)

## 74ABT620

### FEATURES

- Octal bidirectional bus interface
- 3-State buffers
- Power-up 3-State
- Live insertion/extraction permitted
- 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

### DESCRIPTION

The 74ABT620 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT620 device is an octal transceiver featuring inverting 3-State bus compatible outputs in both send and receive directions. The 74ABT620 is designed for asynchronous two-way communication between data buses. The control function implementation allows for maximum flexibility in timing. This device allows data transmission from the A bus to the B bus or from the B bus to the A bus, depending upon the logic levels at the Enable inputs ( $\overline{OEBA}$  and OEAB). The Enable inputs can be used to disable the device so that the buses are effectively isolated.

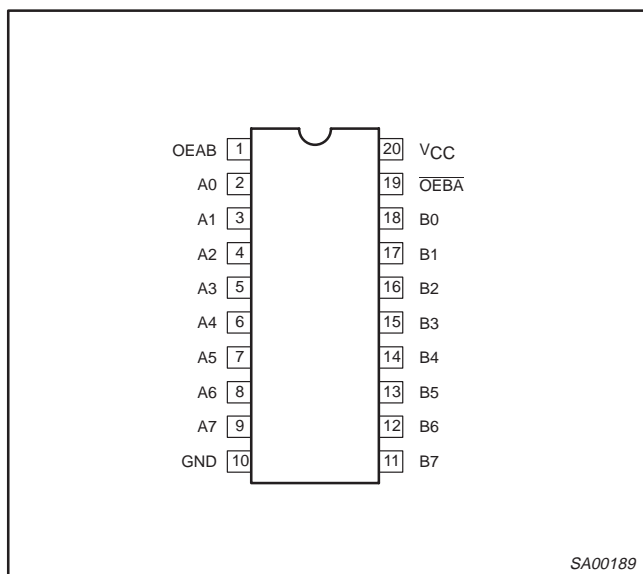
### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS $T_{amb} = 25^{\circ}\text{C}; \text{GND} = 0\text{V}$	TYPICAL	UNIT
$t_{PLH}$ $t_{PHL}$	Propagation delay An to Bn or Bn to An	$C_L = 50\text{pF}; V_{CC} = 5\text{V}$	3.1	ns
$C_{IN}$	Input capacitance OEAB, $\overline{OEBA}$	$V_I = 0\text{V}$ or $V_{CC}$	4	pF
$C_{I/O}$	I/O 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	$\mu\text{A}$

### ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	NORTH AMERICA	DWG NUMBER
20-Pin Plastic DIP	$-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	74ABT620 N	74ABT620 N	SOT146-1
20-Pin plastic SO	$-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	74ABT620 D	74ABT620 D	SOT163-1
20-Pin Plastic SSOP Type II	$-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	74ABT620 DB	74ABT620 DB	SOT339-1
20-Pin Plastic TSSOP Type I	$-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	74ABT620 PW	74ABT620PW DH	SOT360-1

### PIN CONFIGURATION



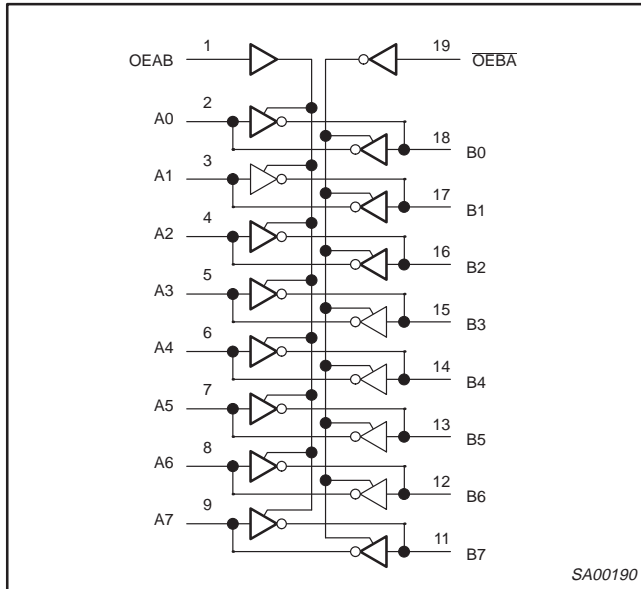
### PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
1	OEAB	Output enable input, A side to B side (active-High)
2, 3, 4, 5, 6, 7, 8, 9	A0 – A7	Data inputs/outputs (A side)
18, 17, 16, 15, 14, 13, 12, 11	B0 – B7	Data inputs/outputs (B side)
19	$\overline{OEBA}$	Output enable input, B side to A side (active-Low)
10	GND	Ground (0V)
20	$V_{CC}$	Positive supply voltage

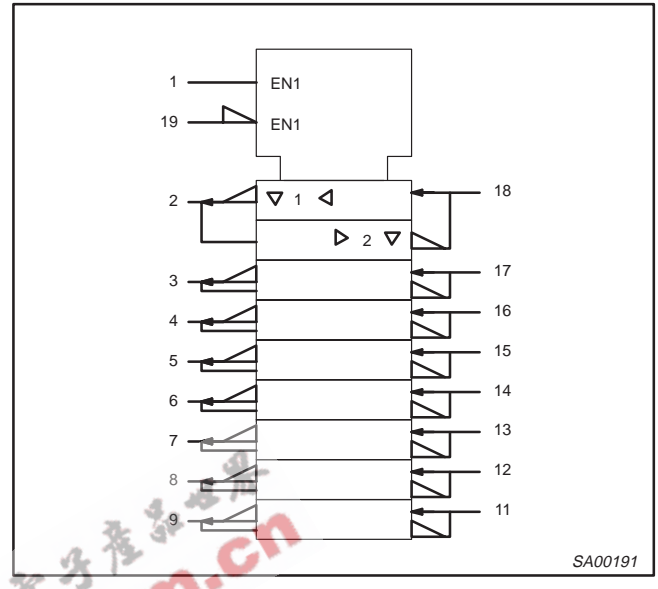
# Octal transceiver with dual enable, inverting (3-State)

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### LOGIC SYMBOL



### LOGIC SYMBOL (IEEE/IEC)



### FUNCTION TABLE

INPUTS		INPUTS/OUTPUTS	
OEBA	OEAB	An	Bn
L	L	$\bar{B}_n$	Inputs
H	H	Inputs	$\bar{A}_n$
H	L	Z	Z
L	H	$\bar{B}_n$ Inputs or Inputs $\bar{A}_n$	

H = High voltage level  
 L = Low voltage level  
 Z = High impedance "off" state

### ABSOLUTE MAXIMUM RATINGS<sup>1, 2</sup>

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 <sup>3</sup>		-1.2 to +7.0	V
$I_{OK}$	DC output diode current	$V_O < 0$	-50	mA
$V_{OUT}$	DC output voltage <sup>3</sup>	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	5	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	Control pins $V_{CC} = 5.5\text{V}; V_I = \text{GND}$ or $5.5\text{V}$		$\pm 0.01$	$\pm 1.0$		$\pm 1.0$	$\mu\text{A}$
		Data pins $V_{CC} = 5.5\text{V}; V_I = \text{GND}$ or $5.5\text{V}$		$\pm 5$	$\pm 100$		$\pm 100$	$\mu\text{A}$
$I_{OFF}$	Power-off leakage current	$V_{CC} = 0.0\text{V}; V_O$ or $V_I \leq 4.5\text{V}$		$\pm 5.0$	$\pm 100$		$\pm 100$	$\mu\text{A}$
$I_{PU}/I_{PD}$	Power-up/down 3-State output current <sup>3</sup>	$V_{CC} = 2.1\text{V}; V_O = 0.5\text{V}; V_I = \text{GND}$ or $V_{CC}$ ; $V_{OE}$ and $\overline{V_{OE}} = \text{Don't care}$		$\pm 5.0$	$\pm 50$		$\pm 50$	$\mu\text{A}$
$I_{IH} + I_{OZH}$	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	$\mu\text{A}$
$I_{IL} + I_{OZL}$	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	$\mu\text{A}$
$I_{CEX}$	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	$\mu\text{A}$
$I_O$	Output current <sup>1</sup>	$V_{CC} = 5.5\text{V}; V_O = 2.5\text{V}$	-50	-100	-180	-50	-180	mA
$I_{CCH}$	Quiescent supply current	$V_{CC} = 5.5\text{V}$ ; Outputs High, $V_I = \text{GND}$ or $V_{CC}$		50	250		250	$\mu\text{A}$
$I_{CCL}$		$V_{CC} = 5.5\text{V}$ ; Outputs Low, $V_I = \text{GND}$ or $V_{CC}$		24	30		30	mA
$I_{CCZ}$		$V_{CC} = 5.5\text{V}$ ; Outputs 3-State; $V_I = \text{GND}$ or $V_{CC}$		50	250		250	$\mu\text{A}$
$\Delta I_{CC}$	Additional supply current per input pin <sup>2</sup>	$V_{CC} = 5.5\text{V}$ ; one input at 3.4V, other inputs at $V_{CC}$ or GND		0.05	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 $\mu\text{sec}$  is permitted.

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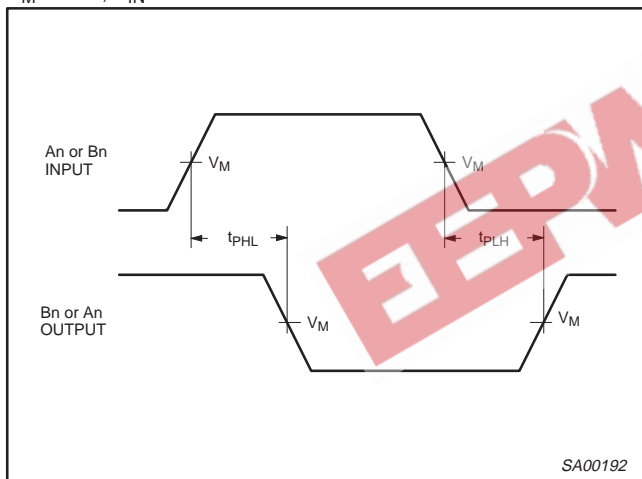
## AC CHARACTERISTICS

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

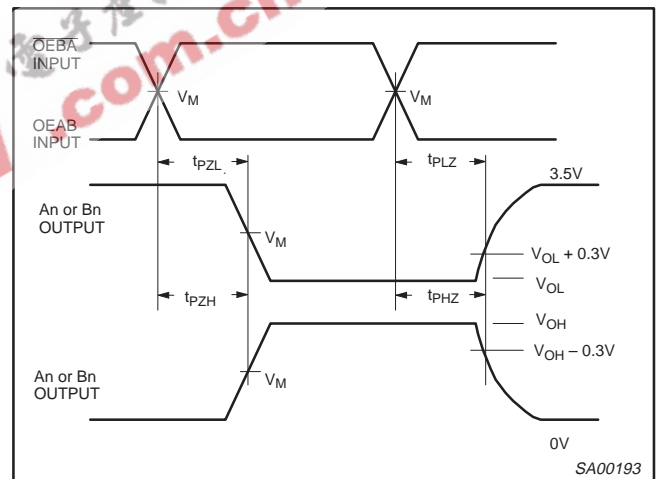
SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT
			$T_{\text{amb}} = +25^\circ\text{C}$ $V_{\text{CC}} = +5.0\text{V}$			$T_{\text{amb}} = -40^\circ\text{C to } +85^\circ\text{C}$ $V_{\text{CC}} = +5.0\text{V} \pm 0.5\text{V}$		
			Min	Typ	Max	Min	Max	
$t_{\text{PLH}}$ $t_{\text{PHL}}$	Propagation delay An to Bn or Bn to An	1	1.0	2.9	4.1	1.0	4.8	ns
$t_{\text{PZH}}$ $t_{\text{PZL}}$	Output enable time OEBA to An	2	1.3	3.2	4.6	1.3	5.5	ns
$t_{\text{PHZ}}$ $t_{\text{PLZ}}$	Output disable time OEBA to An	2	2.0	5.0	6.3	2.0	7.0	ns
$t_{\text{PZH}}$ $t_{\text{PZL}}$	Output enable time OEAB to Bn	2	1.6	4.6	6.2	1.6	6.8	ns
$t_{\text{PHZ}}$ $t_{\text{PLZ}}$	Output disable time OEAB to Bn	2	1.2	3.9	5.6	1.2	6.5	ns
			1.1	2.9	4.7	1.1	5.6	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 to Output 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**

**Input Pulse Definition**

$V_M = 1.5V$

**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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DIP20: plastic dual in-line package; 20 leads (300 mil)

SOT146-1

SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1



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**SSOP20:** plastic shrink small outline package; 20 leads; body width 5.3 mm

**SOT339-1**





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**TSSOP20:** plastic thin shrink small outline package; 20 leads; body width 4.4 mm

**SOT360-1**



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NOTES



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## DEFINITIONS

Data Sheet Identification	Product Status	Definition
<i>Objective Specification</i>	<b>Formative or in Design</b>	This data sheet contains the design target or goal specifications for product development. Specifications may change in any manner without notice.
<i>Preliminary Specification</i>	<b>Preproduction Product</b>	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
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