

Document No.	853-1501
ECN No.	00732
Date of Issue	October 17, 1990
Status	Product Specification
ACL Products	

# 74AC/ACT11620

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

### FEATURES

- Octal bidirectional bus interface
- 3-State buffers
- Inverting version of '623
- Output capability:  $\pm 24$  mA
- CMOS (AC) and TTL (ACT) voltage level inputs
- 50 $\Omega$  incident wave switching
- Center-pin  $V_{CC}$  and ground configuration to minimize high-speed switching noise
- I<sub>CC</sub> category: MSI

### DESCRIPTION

The 74AC/ACT11620 high-performance CMOS devices combine very high speed and high output drive comparable to the most advanced TTL families.

The 74AC/ACT11620 device is an octal transceiver featuring inverting 3-State bus compatible outputs in both send and receive directions.

These octal bus transceivers are designed for asynchronous two-way communication between data buses. The

(continued)

### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS		TYPICAL		UNIT
		$T_{amb} = 25^{\circ}\text{C}; \text{GND} = 0\text{V}; V_{CC} = 5.0\text{V}$		AC	ACT	
$t_{PLH}/t_{PHL}$	Propagation delay $A_n$ to $B_n$ , or $B_n$ to $A_n$	$C_L = 50\text{pF}$		5.0	5.8	ns
$C_{PD}$	Power dissipation capacitance per transceiver <sup>1</sup>	$f = 1\text{MHz}; C_L = 50\text{pF}$	Enabled	54	54	pF
			Disabled	11	11	
$C_{IN}$	Input capacitance	$V_I = 0\text{V}$ or $V_{CC}$		4.0	4.0	pF
$C_{IO}$	I/O capacitance	$V_{IO} = 0\text{V}$ or $V_{CC}$ ; Disabled		12	12	pF
$I_{LATCH}$	Latch-up current	Per Jeduc JC40.2 Standard 17		500	500	mA

#### Note:

1.  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ):

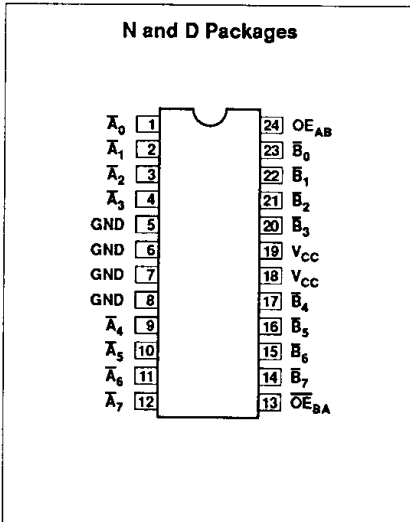
$$P_D = C_{PD} \times V_{CC}^2 \times f_I + \sum (C_L \times V_{CC}^2 \times f_O) \text{ where:}$$

$f_I$  = input frequency in MHz,  $C_L$  = output load capacitance in pF,  
 $f_O$  = output frequency in MHz,  $V_{CC}$  = supply voltage in V,  
 $\sum (C_L \times V_{CC}^2 \times f_O)$  = sum of outputs

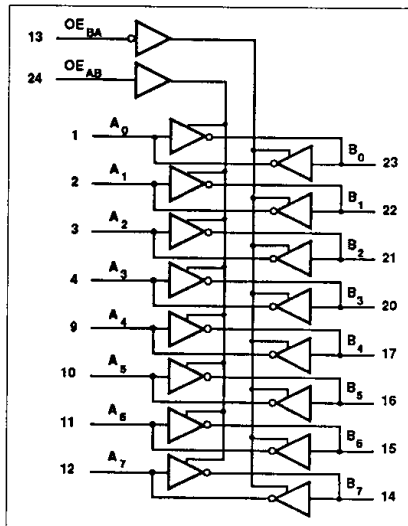
### ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	ORDER CODE
24-pin plastic DIP (300mil-wide)	-40°C to +85°C	74AC11620N 74ACT11620N
24-pin plastic SOL (300mil-wide)	-40°C to +85°C	74AC11620D 74ACT11620D

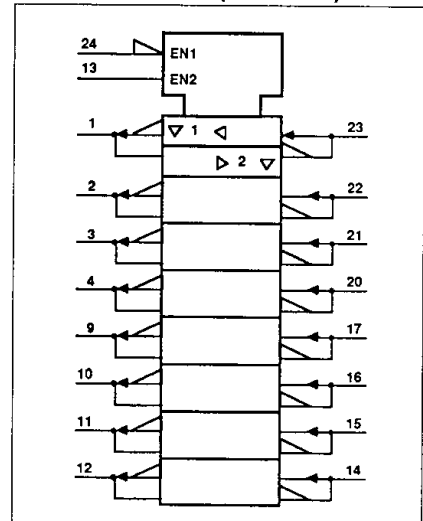
### PIN CONFIGURATION



### LOGIC SYMBOL



### LOGIC SYMBOL (IEEE/IEC)



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control function implementation allows for maximum flexibility in timing.

$\overline{OE}_{BA}$ ). The Enable inputs can be used to disable the device so that the buses are effectively isolated.

and  $\overline{OE}_{BA}$ . Each output reinforces its input in this transceiver configuration. Thus, when both control inputs are enabled and all other data sources to the two sets of the bus lines are at high impedance, both sets of bus lines (16 in all) will remain at their last states.

These devices allow 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 ( $OE_{AB}$ ,

The dual-enable configuration gives this transceiver the capability to store data by the simultaneous enabling of  $OE_{AB}$

## PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
24	$OE_{AB}$	3-state output enable (active High)
13	$\overline{OE}_{BA}$	3-state output enable (active Low)
1, 2, 3, 4, 9, 10, 11, 12	$A_0 - A_7$	Data inputs/outputs (A side)
23, 22, 21, 20, 17, 16, 15, 14	$B_0 - B_7$	Data inputs/outputs (B side)
5, 6, 7, 8	GND	Ground (0V)
18, 19	$V_{CC}$	Positive supply voltage

## FUNCTION TABLE

ENABLE INPUTS		OPERATION
$OE_{AB}$	$\overline{OE}_{BA}$	
L	L	B data to $\overline{A}$ bus
H	H	A data to $\overline{B}$ bus
L	H	Z
H	L	B data to $\overline{A}$ bus, A data to $\overline{B}$ bus

H = High voltage level

L = Low voltage level

Z = High-impedance (OFF) state

## RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	74AC11620			74ACT11620			UNIT
		Min	Nom	Max	Min	Nom	Max	
$V_{CC}$	DC supply voltage	3.0 <sup>1</sup>	5.0	5.5	4.5	5.0	5.5	V
$V_I$	Input voltage	0		$V_{CC}$	0		$V_{CC}$	V
$V_O$	Output voltage	0		$V_{CC}$	0		$V_{CC}$	V
$\Delta t/\Delta v$	Input transition rise or fall rate	A or B	0	10	0		10	ns/V
		$\overline{OE}_{BA}$ or $OE_{AB}$	0	5	0		5	
$T_{amb}$	Operating free-air temperature range	-40		+85	-40		+85	°C

## NOTE:

- No electrical or switching characteristics are specified at  $V_{CC} < 3V$ . Operation between 2V and 3V is not recommended, but within that range, a device output will maintain a previously established logic state.

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ABSOLUTE MAXIMUM RATINGS<sup>1</sup>

SYMBOL	PARAMETER	TEST CONDITIONS	RATING	UNIT
$V_{CC}$	DC supply voltage		-0.5 TO +7.0	V
$I_{IK}$ or $V_I$	DC input diode current <sup>2</sup>	$V_I < 0$	-20	mA
		$V_I > V_{CC}$	20	
	DC input voltage		-0.5 to $V_{CC}+0.5$	V
$I_{OK}$ or $V_O$	DC output diode current <sup>2</sup>	$V_O < 0$	-50	mA
		$V_O > V_{CC}$	50	
	DC output voltage		-0.5 to $V_{CC}+0.5$	V
$I_O$	DC output source or sink current per output pin	$V_O = 0$ to $V_{CC}$	$\pm 50$	mA
$I_{CC}$ or $I_{GND}$	DC $V_{CC}$ current		$\pm 200$	mA
	DC ground current		$\pm 200$	
$T_{STG}$	Storage temperature		-65 to 150	$^{\circ}C$
$P_{TOT}$	Power dissipation per package	Above 70 $^{\circ}C$ ; derate linearly by 8mW/K	500	mW
	Power dissipation per package Plastic surface mount (SO)	Above 70 $^{\circ}C$ ; derate linearly by 8mW/K	400	mW

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

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## DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	V <sub>CC</sub> V	74AC11620				74ACT11620				UNIT	
				T <sub>amb</sub> = +25°C		T <sub>amb</sub> = -40°C to +85°C		T <sub>amb</sub> = +25°C		T <sub>amb</sub> = -40°C to +85°C			
				Min	Max	Min	Max	Min	Max	Min	Max		
V <sub>IH</sub>	High-level input voltage		3.0	2.10		2.10						V	
			4.5	3.15		3.15		2.0		2.0			
			5.5	3.85		3.85		2.0		2.0			
V <sub>IL</sub>	Low-level input voltage		3.0		0.90		0.90					V	
			4.5		1.35		1.35		0.8		0.8		
			5.5		1.65		1.65		0.8		0.8		
V <sub>OH</sub>	High-level output voltage	V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>	I <sub>OH</sub> = -50μA	3.0	2.9		2.9					V	
				4.5	4.4		4.4		4.4		4.4		
				5.5	5.4		5.4		5.4		5.4		
				I <sub>OH</sub> = -4mA	3.0	2.58		2.48					
					4.5	3.94		3.8		3.94			3.8
I <sub>OH</sub> = -24mA	3.0												
	4.5	4.94		4.8		4.94		4.8					
V <sub>OL</sub>	Low-level output voltage	V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>	I <sub>OL</sub> = 50μA	3.0		0.1		0.1				V	
				4.5		0.1		0.1		0.1			0.1
				5.5		0.1		0.1		0.1			0.1
				I <sub>OL</sub> = 12mA	3.0		0.36		0.44				
					4.5		0.36		0.44		0.36		
I <sub>OL</sub> = 24mA	3.0												
	4.5		0.36		0.44		0.36		0.44				
I <sub>OL</sub> = 75mA <sup>1</sup>	3.0				1.65				1.65				
	4.5												
I <sub>I</sub>	Input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND	5.5		±0.1		±1.0		±0.1		±1.0	μA	
I <sub>OZ</sub>	3-State output off-state current	V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub> , V <sub>O</sub> = V <sub>CC</sub> or GND	5.5		±0.5		5.0		±0.5		5.0	μA	
I <sub>CC</sub>	Quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0mA	5.5		8.0		80		8.0		80	μA	
ΔI <sub>CC</sub>	Supply current, TTL inputs High <sup>2</sup>	One input at 3.4V, other inputs at V <sub>CC</sub> or GND	5.5						0.9		1.0	mA	

## NOTES:

1. Not more than one output should be tested at a time, and the duration of the test should not exceed 10ms.
2. This is the increase in supply current for each input that is at one of the specified TTL voltage levels rather than 0V or V<sub>CC</sub>.

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AC ELECTRICAL CHARACTERISTICS AT 3.3V  $\pm 0.3V$ 

SYMBOL	PARAMETER	WAVEFORM	74AC11620					UNIT
			T <sub>amb</sub> = +25°C			T <sub>amb</sub> = -40°C to +85°C		
			Min	Typ	Max	Min	Max	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay A <sub>n</sub> to B <sub>n</sub>	1	1.5 1.5	6.8 6.5	9.0 8.2	1.5 1.5	11.1 9.8	ns
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay B <sub>n</sub> to A <sub>n</sub>	1	1.5 1.5	6.8 6.5	9.0 8.2	1.5 1.5	11.1 9.8	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output enable time OE <sub>BA</sub> to A <sub>n</sub>	2	1.5 1.5	8.0 7.3	10.3 9.8	1.5 1.5	12.7 11.6	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output enable time OE <sub>AB</sub> to B <sub>n</sub>	2	1.5 1.5	8.4 8.1	10.0 10.1	1.5 1.5	12.4 12.3	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output disable time OE <sub>BA</sub> to A <sub>n</sub>	2	1.5 1.5	6.7 7.8	8.4 9.6	1.5 1.5	9.5 11.0	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output disable time OE <sub>AB</sub> to B <sub>n</sub>	2	1.5 1.5	7.0 7.7	8.7 9.6	1.5 1.5	9.8 10.9	ns

AC ELECTRICAL CHARACTERISTICS AT 5.0V  $\pm 0.5V$ 

SYMBOL	PARAMETER	WAVEFORM	74AC11620					UNIT
			T <sub>amb</sub> = +25°C			T <sub>amb</sub> = -40°C to +85°C		
			Min	Typ	Max	Min	Max	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay A <sub>n</sub> to B <sub>n</sub>	1	1.5 1.5	5.2 4.8	6.6 6.3	1.5 1.5	7.9 7.7	ns
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay B <sub>n</sub> to A <sub>n</sub>	1	1.5 1.5	5.2 4.8	6.6 6.3	1.5 1.5	7.9 7.7	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output enable time OE <sub>BA</sub> to A <sub>n</sub>	2	1.5 1.5	6.0 5.5	7.8 7.6	1.5 1.5	9.6 9.2	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output enable time OE <sub>AB</sub> to B <sub>n</sub>	2	1.5 1.5	6.2 6.0	7.7 7.8	1.5 1.5	9.5 9.6	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output disable time OE <sub>BA</sub> to A <sub>n</sub>	2	1.5 1.5	5.9 6.3	7.5 8.1	1.5 1.5	8.4 9.2	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output disable time OE <sub>AB</sub> to B <sub>n</sub>	2	1.5 1.5	6.1 6.2	7.7 7.9	1.5 1.5	8.5 9.0	ns

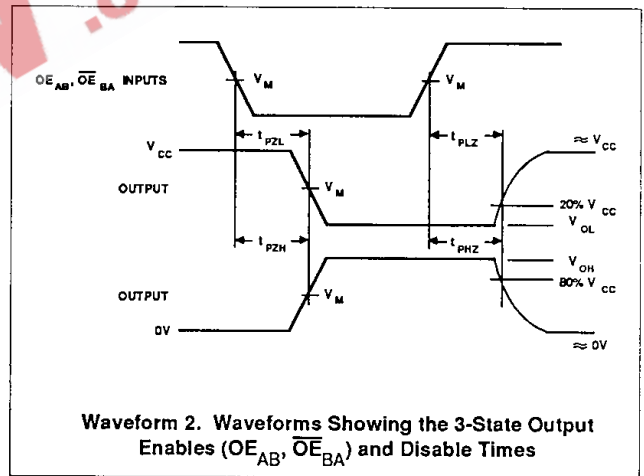
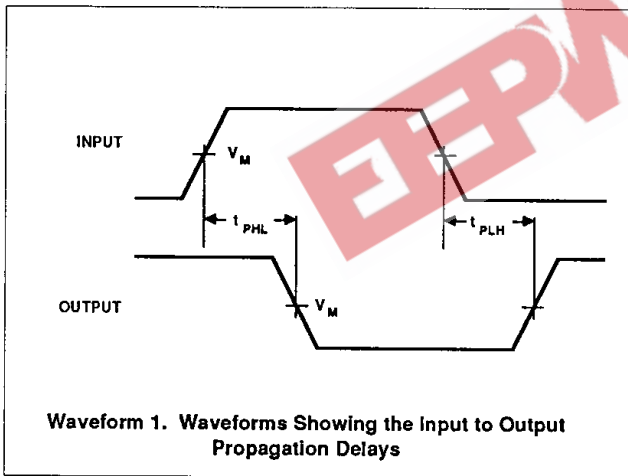
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AC ELECTRICAL CHARACTERISTICS AT 5.0V ±0.5V

SYMBOL	PARAMETER	WAVEFORM	74ACT11620					UNIT
			T <sub>amb</sub> = +25°C			T <sub>amb</sub> = -40°C to +85°C		
			Min	Typ	Max	Min	Max	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay A <sub>n</sub> to $\overline{B}_n$	1	1.5 1.5	5.7 5.9	8.5 7.7	1.5 1.5	10.0 9.2	ns
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay B <sub>n</sub> to $\overline{A}_n$	1	1.5 1.5	5.7 5.9	8.5 7.7	1.5 1.5	10.0 9.2	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output enable time $\overline{OE}_{BA}$ to $\overline{A}_n$	2	1.5 1.5	7.2 7.1	9.1 9.2	1.5 1.5	11.1 10.8	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output enable time OE <sub>AB</sub> to $\overline{B}_n$	2	1.5 1.5	7.5 7.7	10.2 9.8	1.5 1.5	12.2 11.9	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output disable time $\overline{OE}_{BA}$ to $\overline{A}_n$	2	1.5 1.5	7.9 8.3	9.6 10.0	1.5 1.5	11.0 11.6	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output disable time OE <sub>AB</sub> to $\overline{B}_n$	2	1.5 1.5	7.2 7.2	8.9 8.9	1.5 1.5	9.8 10.0	ns

AC WAVEFORMS



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WAVEFORM CONDITIONS

	INPUTS	OUTPUTS
AC	$V_{IN} = \text{GND to } V_{CC}$ $V_M = 50\% V_{CC}$	$V_{OUT} = V_{OL} \text{ to } V_{OH}$
ACT	$V_{IN} = \text{GND to } 3.0V$ $V_M = 1.5V$	$V_M = 50\% V_{CC}$

TEST CIRCUIT

