

# HD74AC245/HD74ACT245

## Octal Bi-directional Transceiver with 3-State Input/Output

REJ03D0263-0200Z  
(Previous ADE-205-384 (Z))  
Rev.2.00  
Jul.16.2004

### Description

The HD74AC245/HD74ACT245 contains eight non-inverting bidirectional buffers with 3-state outputs and is intended for bus-oriented applications. Current sinking capability is 24 mA at both the A and B ports. The Transmit/Receive (T/R) input determines the direction of data flow through the bidirectional transceiver. Transmit (active-High) enables data from A ports to B ports; Receive (active-Low) enables data from B ports to A ports. The Output Enable input, when High, disables, both A and B ports by placing them in a High Z condition.

### Features

- Noninverting Buffers
- Bi-directional Data Path
- A and B Outputs Source/Sink 24 mA
- HD74ACT245 has TTL-Compatible Inputs
- Ordering Information: Ex. HD74AC245

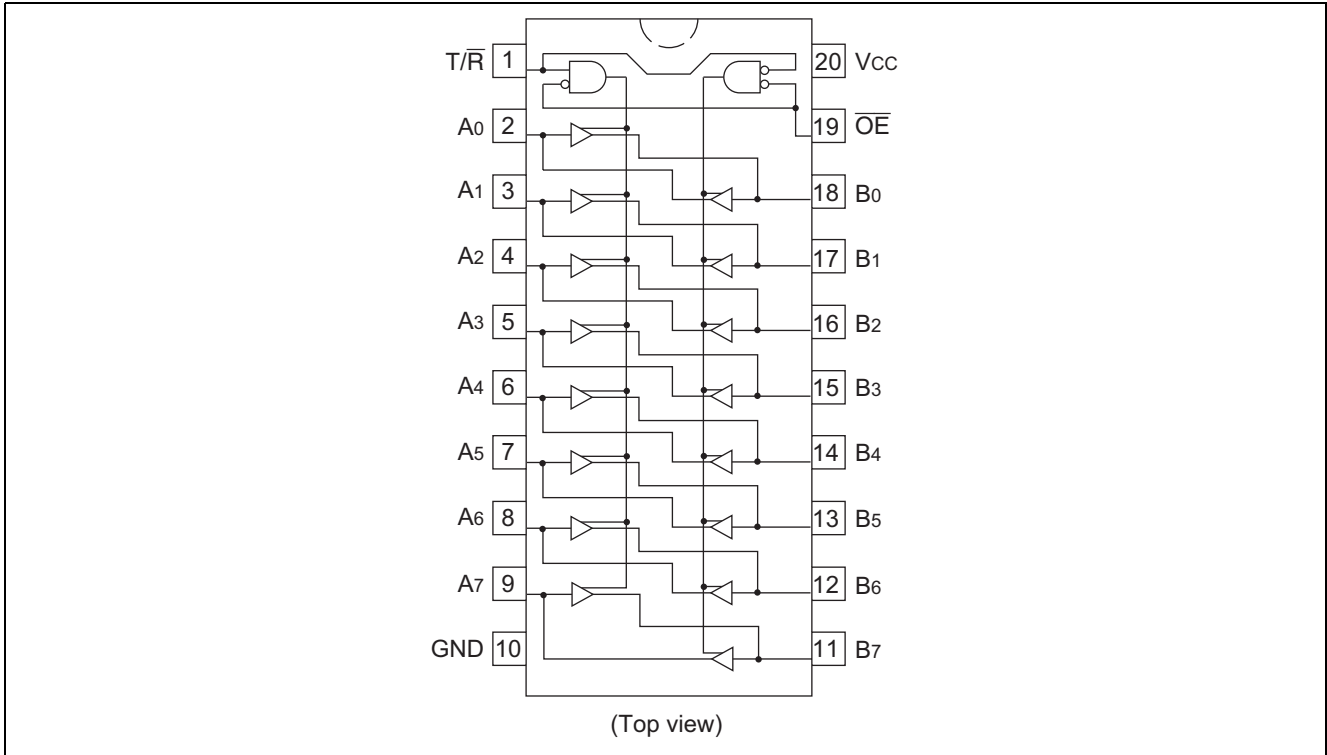
Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74AC245P	DIP-20 pin	DP-20N, -20NEV	P	—
HD74AC245FPEL	SOP-20 pin (JEITA)	FP-20DAV	FP	EL (2,000 pcs/reel)
HD74AC245RPEL	SOP-20 pin (JEDEC)	FP-20DBV	RP	EL (1,000 pcs/reel)
HD74AC245TELL	TSSOP-20 pin	TTP-20DAV	T	ELL (2,000 pcs/reel)

- Notes: 1. Please consult the sales office for the above package availability.  
2. The packages with lead-free pins are distinguished from the conventional products by adding V at the end of the package code.

**Pin Names**

- $\overline{OE}$  Output Enable Input
- $T/\overline{R}$  Transmit/Receive Input
- $A_0$  to  $A_7$  Side A 3-State Inputs or 3-State Outputs
- $B_0$  to  $B_7$  Side B 3-State Inputs or 3-State Outputs

**Pin Arrangement**



**Truth Tables**

Inputs		Outputs
$\overline{OE}$	$T/\overline{R}$	
L	L	Bus B Data to Bus A
L	H	Bus A Data to Bus B
H	X	High Z State

- H : High Voltage Level
- L : Low Voltage Level
- X : Immaterial

**Absolute Maximum Ratings**

Item	Symbol	Ratings	Unit	Condition
Supply voltage	$V_{CC}$	-0.5 to 7	V	
DC input diode current	$I_{IK}$	-20	mA	$V_I = -0.5V$
		20	mA	$V_I = V_{CC}+0.5V$
DC input voltage	$V_I$	-0.5 to $V_{CC}+0.5$	V	
DC output diode current	$I_{OK}$	-50	mA	$V_O = -0.5V$
		50	mA	$V_O = V_{CC}+0.5V$
DC output voltage	$V_O$	-0.5 to $V_{CC}+0.5$	V	
DC output source or sink current	$I_O$	$\pm 50$	mA	
DC $V_{CC}$ or ground current per output pin	$I_{CC}, I_{GND}$	$\pm 50$	mA	
Storage temperature	$T_{stg}$	-65 to +150	$^{\circ}C$	

**Recommended Operating Conditions: HD74AC245**

Item	Symbol	Ratings	Unit	Condition
Supply voltage	$V_{CC}$	2 to 6	V	
Input and Output voltage	$V_I, V_O$	0 to $V_{CC}$	V	
Operating temperature	$T_a$	-40 to +85	°C	
Input rise and fall time (except Schmitt inputs) $V_{IN}$ 30% to 70% $V_{CC}$	$t_r, t_f$	8	ns/V	$V_{CC} = 3.0V$
				$V_{CC} = 4.5 V$
				$V_{CC} = 5.5 V$

**DC Characteristics: HD74AC245**

Item	Sym- bol	Vcc (V)	$T_a = 25^\circ C$			$T_a = -40$ to $+85^\circ C$		Unit	Condition			
			min.	typ.	max.	min.	max.					
Input Voltage	$V_{IH}$	3.0	2.1	1.5	—	2.1	—	V	$V_{OUT} = 0.1 V$ or $V_{CC} - 0.1 V$			
		4.5	3.15	2.25	—	3.15	—					
		5.5	3.85	2.75	—	3.85	—					
	$V_{IL}$	3.0	—	1.50	0.9	—	0.9		$V_{OUT} = 0.1 V$ or $V_{CC} - 0.1 V$			
		4.5	—	2.25	1.35	—	1.35					
		5.5	—	2.75	1.65	—	1.65					
Output voltage	$V_{OH}$	3.0	2.9	2.99	—	2.9	—	V	$V_{IN} = V_{IL}$ or $V_{IH}$ $I_{OUT} = -50 \mu A$			
		4.5	4.4	4.49	—	4.4	—					
		5.5	5.4	5.49	—	5.4	—					
		3.0	2.58	—	—	2.48	—				$V_{IN} = V_{IL}$ or $V_{IH}$	$I_{OH} = -12 mA$
		4.5	3.94	—	—	3.80	—					$I_{OH} = -24 mA$
		5.5	4.94	—	—	4.80	—					$I_{OH} = -24 mA$
	$V_{OL}$	3.0	—	0.002	0.1	—	0.1		$V_{IN} = V_{IL}$ or $V_{IH}$ $I_{OUT} = 50 \mu A$			
		4.5	—	0.001	0.1	—	0.1					
		5.5	—	0.001	0.1	—	0.1					
		3.0	—	—	0.32	—	0.37		$V_{IN} = V_{IL}$ or $V_{IH}$	$I_{OL} = 12 mA$		
		4.5	—	—	0.32	—	0.37			$I_{OL} = 24 mA$		
		5.5	—	—	0.32	—	0.37			$I_{OL} = 24 mA$		
Input leakage current	$I_{IN}$	5.5	—	—	$\pm 0.1$	—	$\pm 1.0$	$\mu A$	$V_{IN} = V_{CC}$ or GND			
3 State current	$I_{OZ}$	5.5	—	—	$\pm 0.5$	—	$\pm 5.0$	$\mu A$	$V_{IN(OE)} = V_{IL}, V_{IH}$ $V_{IN} = V_{CC}$ or GND $V_{OUT} = V_{CC}$ or GND			
Dynamic output current*	$I_{OLD}$	5.5	—	—	—	86	—	mA	$V_{OLD} = 1.1 V$			
	$I_{OHD}$	5.5	—	—	—	-75	—	mA	$V_{OHD} = 3.85 V$			
Quiescent supply current	$I_{CC}$	5.5	—	—	8.0	—	80	$\mu A$	$V_{IN} = V_{CC}$ or ground			

\*Maximum test duration 2.0 ms, one output loaded at a time.

**Recommended Operating Conditions: HD74ACT245**

Item	Symbol	Ratings	Unit	Condition
Supply voltage	$V_{CC}$	2 to 6	V	
Input and output voltage	$V_I, V_O$	0 to $V_{CC}$	V	
Operating temperature	$T_a$	-40 to +85	°C	
Input rise and fall time (except Schmitt inputs) $V_{IN}$ 0.8 to 2.0 V	$t_r, t_f$	8	ns/V	$V_{CC} = 4.5V$ $V_{CC} = 5.5V$

**DC Characteristics: HD74ACT245**

Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Condition				
			min.	typ.	max.	min.	max.						
Input voltage	V <sub>IH</sub>	4.5	2.0	1.5	—	2.0	—	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> -0.1 V				
		5.5	2.0	1.5	—	2.0	—						
	V <sub>IL</sub>	4.5	—	1.5	0.8	—	0.8		V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> -0.1 V				
		5.5	—	1.5	0.8	—	0.8						
Output voltage	V <sub>OH</sub>	4.5	4.4	4.49	—	4.4	—	V	V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OUT</sub> = -50 μA				
		5.5	5.4	5.49	—	5.4	—						
		4.5	3.94	—	—	3.80	—			V <sub>IN</sub> = V <sub>IL</sub> I <sub>OH</sub> = -24 mA			
		5.5	4.94	—	—	4.80	—				I <sub>OH</sub> = -24 mA		
	V <sub>OL</sub>	4.5	—	0.001	0.1	—	0.1		V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OUT</sub> = 50 μA				
		5.5	—	0.001	0.1	—	0.1						
		4.5	—	—	0.32	—	0.37			V <sub>IN</sub> = V <sub>IL</sub> I <sub>OL</sub> = 24 mA			
		5.5	—	—	0.32	—	0.37				I <sub>OL</sub> = 24 mA		
		Input current	I <sub>IN</sub>	5.5	—	—	±0.1			—	±1.0	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND
		3 State current	I <sub>OZ</sub>	5.5	—	—	±0.5			—	±5.0	μA	V <sub>IN</sub> = V <sub>IL</sub> , V <sub>IH</sub> V <sub>OUT</sub> = V <sub>CC</sub> or GND
I <sub>CC</sub> /input current	I <sub>CCT</sub>	5.5	—	0.6	—	—	1.5	mA	V <sub>IN</sub> = V <sub>CC</sub> -2.1 V				
Dynamic output current*	I <sub>OLD</sub>	5.5	—	—	—	86	—	mA	V <sub>OLD</sub> = 1.1 V				
	I <sub>OHD</sub>	5.5	—	—	—	-75	—	mA	V <sub>OHD</sub> = 3.85 V				
Quiescent supply current	I <sub>CC</sub>	5.5	—	—	8.0	—	80	μA	V <sub>IN</sub> = V <sub>CC</sub> or ground				

\*Maximum test duration 2.0 ms, one output loaded at a time.

**AC Characteristics: HD74AC245**

Item	Symbol	V <sub>CC</sub> (V)*1	Ta = +25°C C <sub>L</sub> = 50 pF			Ta = -40°C to +85°C C <sub>L</sub> = 50 pF		Unit
			Min	Typ	Max	Min	Max	
Propagation delay Data to output	t <sub>PLH</sub>	3.3	1.0	5.0	8.5	1.0	9.0	ns
		5.0	1.0	3.5	6.5	1.0	7.0	
Propagation delay Data to output	t <sub>PHL</sub>	3.3	1.0	5.0	8.5	1.0	9.0	ns
		5.0	1.0	3.5	6.0	1.0	7.0	
Output enable time	t <sub>ZH</sub>	3.3	1.0	7.0	11.5	1.0	12.5	ns
		5.0	1.0	5.0	8.5	1.0	9.0	
Output enable time	t <sub>ZL</sub>	3.3	1.0	7.5	12.0	1.0	13.5	ns
		5.0	1.0	5.5	9.0	1.0	9.5	
Output disable time	t <sub>HZ</sub>	3.3	1.0	6.5	12.0	1.0	12.5	ns
		5.0	1.0	5.5	9.0	1.0	10.0	
Output disable time	t <sub>LZ</sub>	3.3	1.0	7.0	11.5	1.0	13.0	ns
		5.0	1.0	5.5	9.0	1.0	10.0	

Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V  
Voltage Range 5.0 is 5.0 V ± 0.5 V

## AC Characteristics: HD74ACT245

Item	Symbol	$V_{CC}$ (V)*1	Ta = +25°C C <sub>L</sub> = 50 pF			Ta = -40°C to +85°C C <sub>L</sub> = 50 pF		Unit
			Min	Typ	Max	Min	Max	
Propagation delay Data to output	t <sub>PLH</sub>	5.0	1.0	4.0	7.5	1.0	8.0	ns
Propagation delay Data to output	t <sub>PHL</sub>	5.0	1.0	4.0	8.0	1.0	9.0	ns
Output enable time	t <sub>ZH</sub>	5.0	1.0	5.0	10.0	1.0	11.0	ns
Output enable time	t <sub>ZL</sub>	5.0	1.0	5.5	10.0	1.0	12.0	ns
Output disable time	t <sub>HZ</sub>	5.0	1.0	5.5	10.0	1.0	11.0	ns
Output disable time	t <sub>LZ</sub>	5.0	1.0	5.0	10.0	1.0	11.0	ns

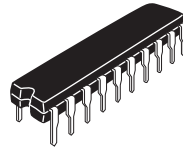
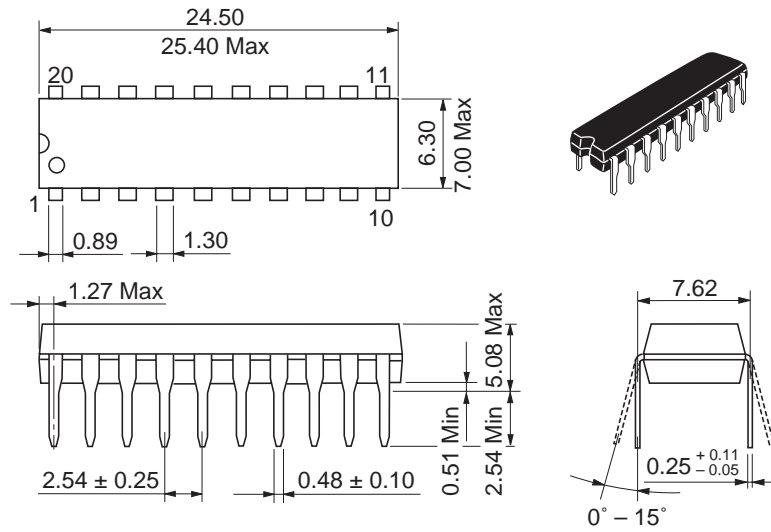
Note: 1. Voltage Range 5.0 is 5.0 V ± 0.5 V

## Capacitance

Item	Symbol	Typ	Unit	Condition
Input capacitance	C <sub>IN</sub>	4.5	pF	V <sub>CC</sub> = 5.5 V
Input/output capacitance	C <sub>I/O</sub>	15.0	pF	V <sub>CC</sub> = 5.5 V
Power dissipation capacitance	C <sub>PD</sub>	45.0	pF	V <sub>CC</sub> = 5.0 V

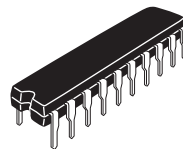
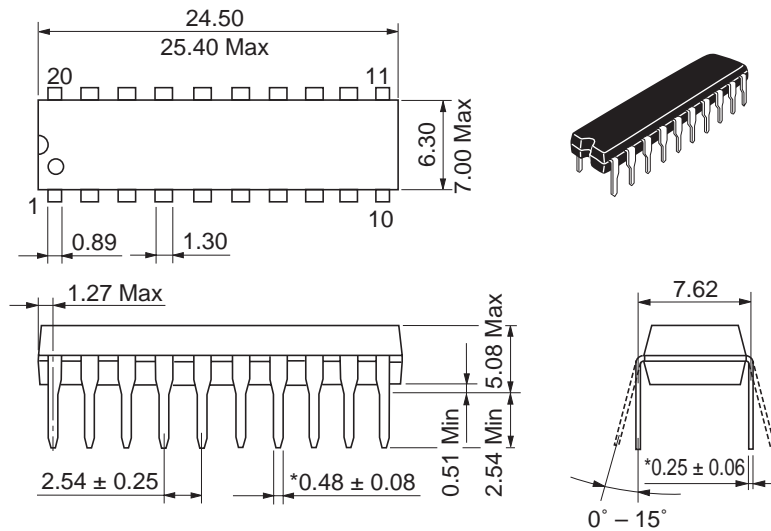
Package Dimensions

As of January, 2003  
Unit: mm



Package Code	DP-20N
JEDEC	—
JEITA	Conforms
Mass (reference value)	1.26 g

Unit: mm

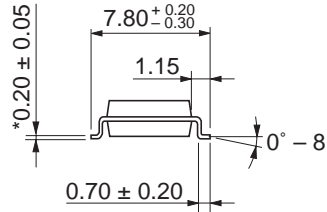
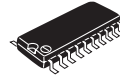
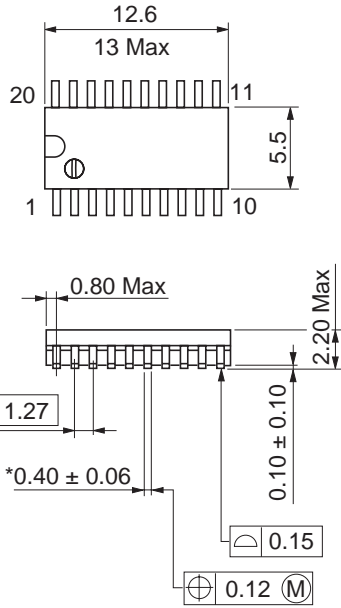


\*Ni/Pd/AU Plating

Package Code	DP-20NEV
JEDEC	—
JEITA	Conforms
Mass (reference value)	1.26 g

As of January, 2003

Unit: mm

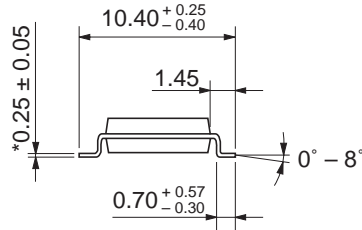
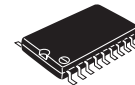
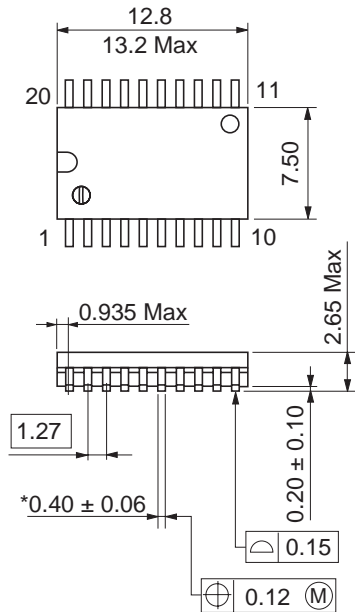


\*Ni/Pd/Au plating

Package Code	FP-20DAV
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.31 g

As of January, 2003

Unit: mm

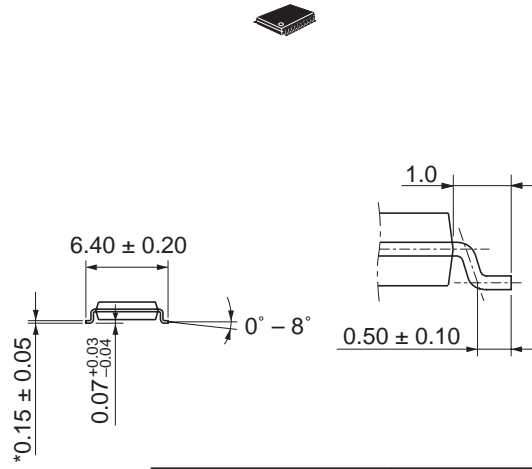
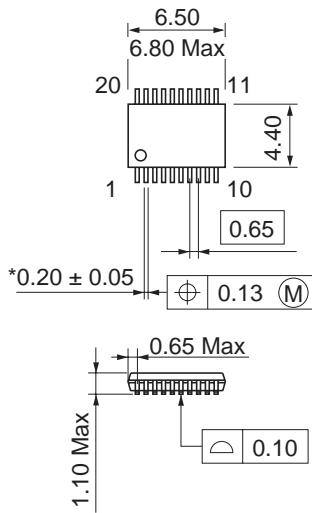


\*Ni/Pd/Au plating

Package Code	FP-20DBV
JEDEC	Conforms
JEITA	—
Mass (reference value)	0.52 g

As of January, 2003

Unit: mm



\*Ni/Pd/Au plating

Package Code	TTP-20DAV
JEDEC	—
JEITA	—
Mass (reference value)	0.07 g



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