



# HD74AC157

## Quad 2-Input Multiplexer

REJ03D0252-0200Z  
 (Previous ADE-205-371 (Z))  
 Rev.2.00  
 Jul.16.2004

### Description

The HD74AC157 is a high-speed quad 2-input multiplexer. Four bits of data from two sources can be selected using the common Select and Enable inputs. The four outputs present the selected data in the true (noninverted) form. The HD74AC157 can also be used as a function generator.

### Features

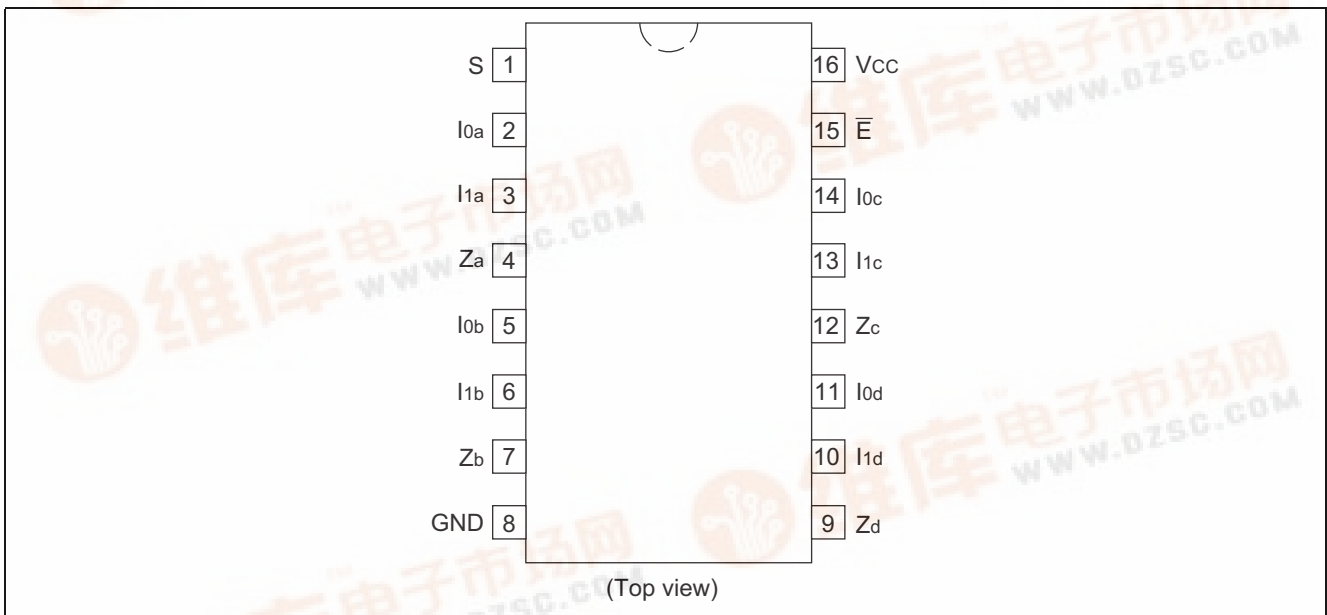
- Outputs Source/Sink 24 mA
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74AC157AFPEL	SOP-16 pin (JEITA)	FP-16DAV	FP	EL (2,000 pcs/reel)
HD74AC157ARPEL	SOP-16 pin (JEDEC)	FP-16DNV	RP	EL (2,500 pcs/reel)
HD74AC157TELL	TSSOP-16 pin	TTP-16DAV	T	ELL(2,000 pcs/reel)

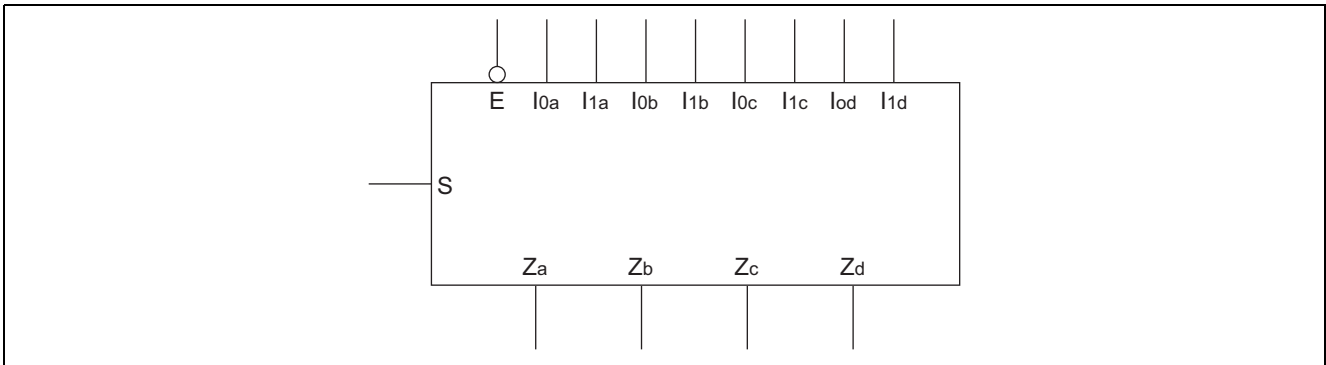
Notes: 1. Please consult the sales office for the above package availability.

2. The packages with lead-free pins are distinguished from the conventional products by adding V at the end of the package code.

### Pin Arrangement



**Logic Symbol**



**Pin Names**

- I<sub>0a</sub> to I<sub>0d</sub> Source 0 Data Inputs
- I<sub>1a</sub> to I<sub>1d</sub> Source 1 Data Inputs
- $\bar{E}$  Enable Input
- S Select Input
- Z<sub>a</sub> to Z<sub>d</sub> Outputs

**Functional Description**

The HD74AC157 is a quad 2-input multiplexer. It selects four bits of data from two sources under the control of a common Select input (S). The Enable input ( $\bar{E}$ ) is active-Low. when  $\bar{E}$  is High, all of the outputs (Z) are forced Low regardless of all other inputs. The HD74AC157 is the logic implementation of a 4-pole, 2-position switch where the position of the switch is determined by the logic levels supplied to the Select input. The logic equations for the outputs are shown below:

$$Z_a = \bar{E} \cdot (I_{1a} \cdot S + I_{0a} \cdot \bar{S})$$

$$Z_b = \bar{E} \cdot (I_{1b} \cdot S + I_{0b} \cdot \bar{S})$$

$$Z_c = \bar{E} \cdot (I_{1c} \cdot S + I_{0c} \cdot \bar{S})$$

$$Z_d = \bar{E} \cdot (I_{1d} \cdot S + I_{0d} \cdot \bar{S})$$

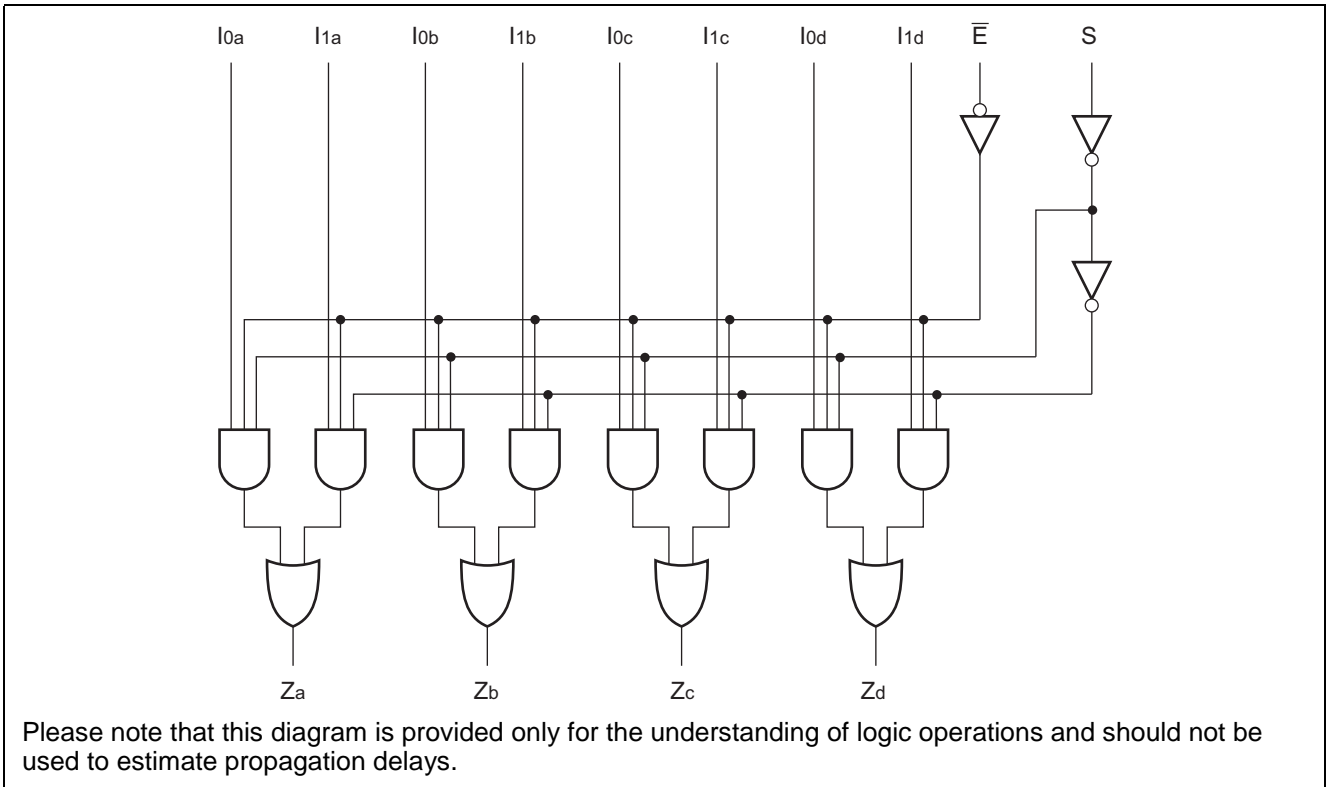
A common use of the HD74AC157 is the moving of data from two groups of register to four common output busses. The particular register from which the data comes is determined by the state of the Select input. A less obvious use is as a function generator. The HD74AC157 can generate any four of the sixteen different functions of two variables with one variable common. This is useful for implementing gating functions.

**Truth Table**

Inputs				Output
E	S	I <sub>0</sub>	I <sub>1</sub>	Z
H	X	X	X	L
L	H	X	L	L
L	H	X	H	H
L	L	L	X	L
L	L	H	X	H

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

Logic Diagram



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

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	$^{\circ}C$	
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

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>	3.0	2.1	1.5	—	2.1	—	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V				
		4.5	3.15	2.25	—	3.15	—						
		5.5	3.85	2.75	—	3.85	—						
	V <sub>IL</sub>	3.0	—	1.50	0.9	—	0.9		V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V				
		4.5	—	2.25	1.35	—	1.35						
		5.5	—	2.75	1.65	—	1.65						
Output voltage	V <sub>OH</sub>	3.0	2.9	2.99	—	2.9	—	V	V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OUT</sub> = -50 μA				
		4.5	4.4	4.49	—	4.4	—						
		5.5	5.4	5.49	—	5.4	—						
		3.0	2.58	—	—	2.48	—			V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OH</sub> = -12 mA			
		4.5	3.94	—	—	3.80	—				I <sub>OH</sub> = -24 mA		
		5.5	4.94	—	—	4.80	—				I <sub>OH</sub> = -24 mA		
	V <sub>OL</sub>	3.0	—	0.002	0.1	—	0.1		V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OUT</sub> = 50 μA				
		4.5	—	0.001	0.1	—	0.1						
		5.5	—	0.001	0.1	—	0.1						
		3.0	—	—	0.32	—	0.37			V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OL</sub> = 12 mA			
		4.5	—	—	0.32	—	0.37				I <sub>OL</sub> = 24 mA		
		5.5	—	—	0.32	—	0.37				I <sub>OL</sub> = 24 mA		
		Input leakage current	I <sub>IN</sub>	5.5	—	—	±0.1			—	±1.0	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND
		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: HD74AC157

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 S to Z <sub>n</sub>	t <sub>PLH</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	
Propagation delay S to Z <sub>n</sub>	t <sub>PHL</sub>	3.3	1.0	6.5	11.0	1.0	12.0	ns
		5.0	1.0	5.0	8.5	1.0	9.5	
Propagation delay E̅ to Z <sub>n</sub>	t <sub>PLH</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	
Propagation delay E̅ to Z <sub>n</sub>	t <sub>PHL</sub>	3.3	1.0	6.5	11.0	1.0	12.0	ns
		5.0	1.0	5.5	9.0	1.0	9.5	
Propagation delay I <sub>n</sub> to Z <sub>n</sub>	t <sub>PLH</sub>	3.3	1.0	5.0	8.5	1.0	9.0	ns
		5.0	1.0	4.0	6.5	1.0	7.0	
Propagation delay I <sub>n</sub> to Z <sub>n</sub>	t <sub>PHL</sub>	3.3	1.0	5.0	8.0	1.0	9.0	ns
		5.0	1.0	4.0	6.5	1.0	7.0	

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

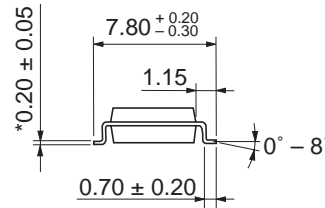
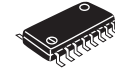
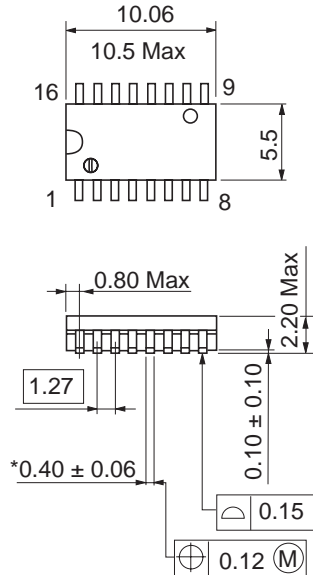
### Capacitance

Item	Symbol	Typ	Unit	Condition
Input capacitance	$C_{IN}$	4.5	pF	$V_{CC} = 5.5 \text{ V}$
Power dissipation capacitance	$C_{PD}$	50.0	pF	$V_{CC} = 5.0 \text{ V}$

Package Dimensions

As of January, 2003

Unit: mm

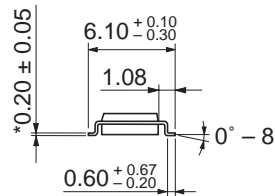
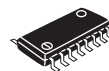
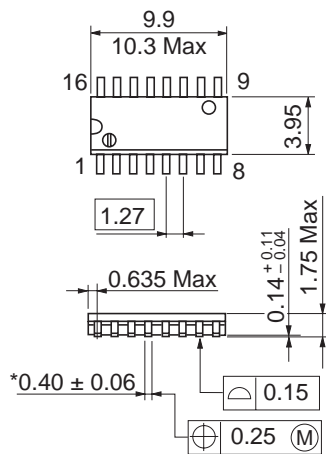


\*Ni/Pd/Au plating

Package Code	FP-16DAV
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.24 g

As of January, 2003

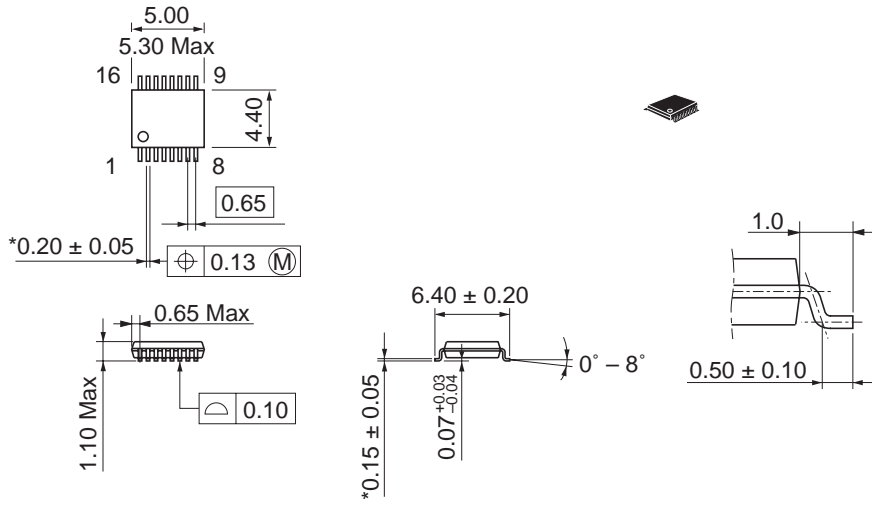
Unit: mm



\*Ni/Pd/Au plating

Package Code	FP-16DNV
JEDEC	Conforms
JEITA	Conforms
Mass (reference value)	0.15 g

As of January, 2003  
Unit: mm



\*Ni/Pd/Au plating

Package Code	TTP-16DAV
JEDEC	—
JEITA	—
Mass (reference value)	0.05 g

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