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.

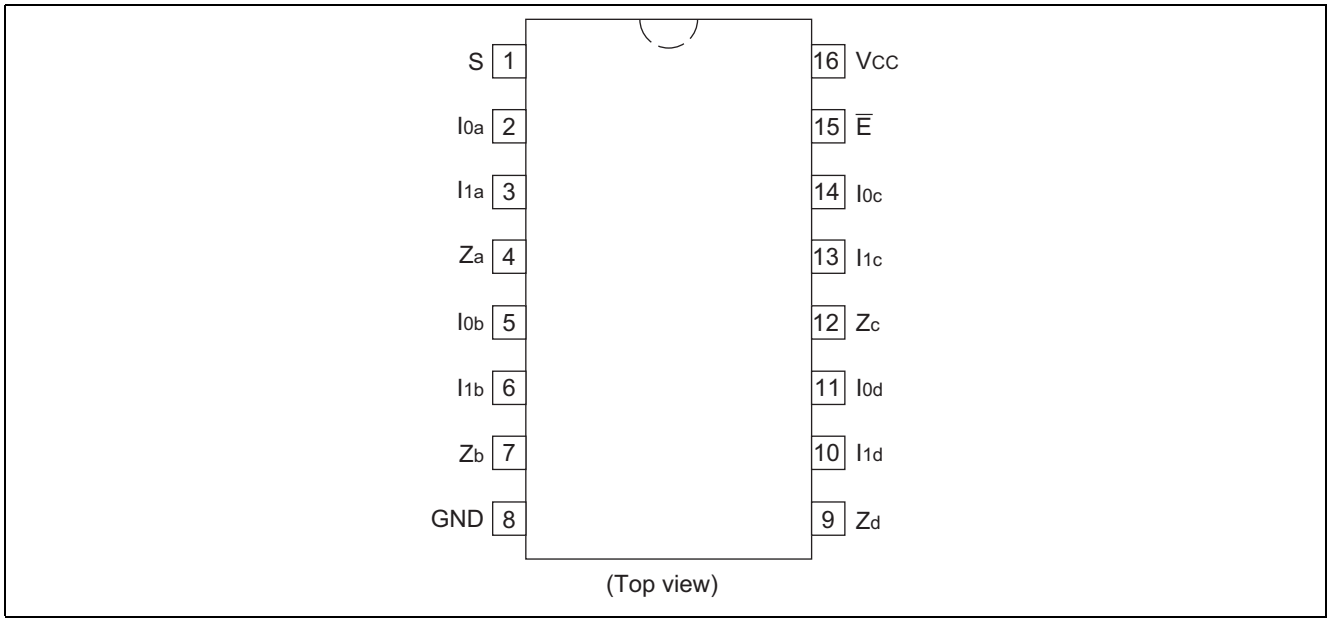
Features

- 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)

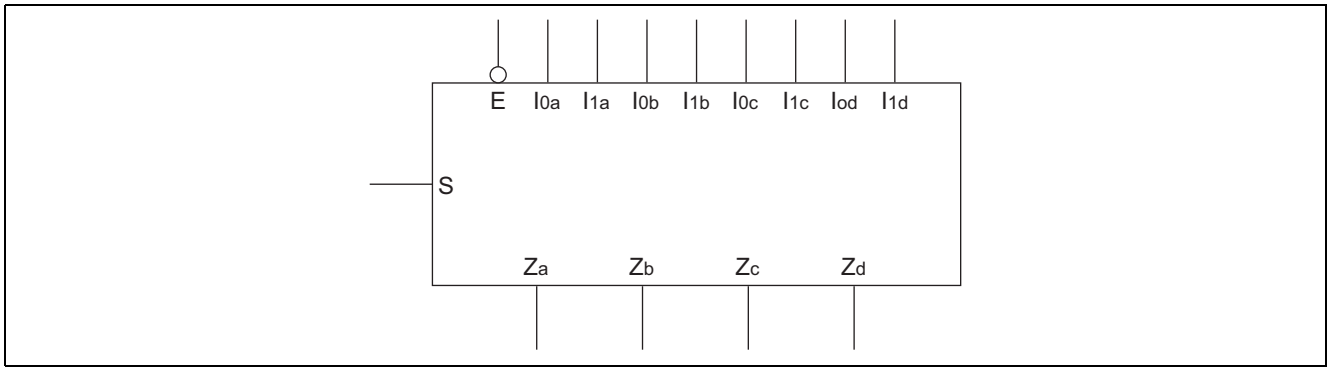
Notes: 1. Please consult the sales office for the above package availability.
2. The packages with lead-free pins are distinguished from the conventional products by adding V at the end of the package code.

Pin Arrangement



(Top view)

Logic Symbol



Pin Names

I_{0a} to I_{0d}	Source 0 Data Inputs
I_{1a} to I_{1d}	Source 1 Data Inputs
$\overline{E}$	Enable Input
S	Select Input
Z_a to Z_d	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 ($\overline{E}$) is active-Low. when $\overline{E}$ 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:

$Z_a = \overline{E} \cdot (I_{1a} \cdot S + I_{0a} \cdot \overline{S})$
$Z_b = \overline{E} \cdot (I_{1b} \cdot S + I_{0b} \cdot \overline{S})$
$Z_c = \overline{E} \cdot (I_{1c} \cdot S + I_{0c} \cdot \overline{S})$
$Z_d = \overline{E} \cdot (I_{1d} \cdot S + I_{0d} \cdot \overline{S})$

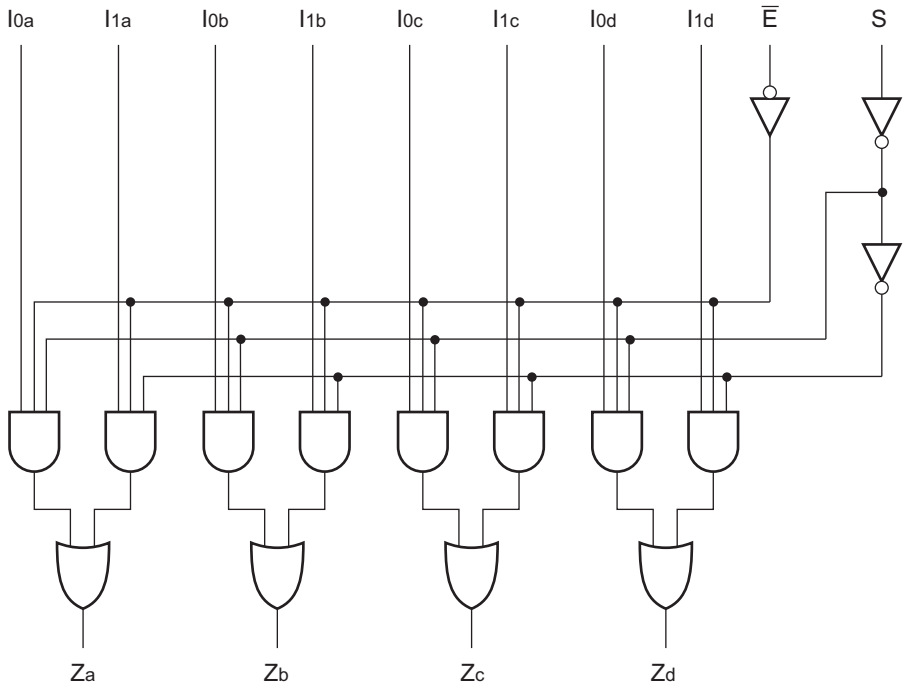
A common use of the HD74AC157 is the moving of data from two groups of register to four common output busses. The particular register from which the data comes is determined by the state of the Select input. A less obvious use is as a function generator. The HD74AC157 can generate any four of the sixteen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

Truth Table

Inputs				Output
E	**S**	**I_0**	**I_1**	**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



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

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 = Vcc+0.5V
DC input voltage	V_I	–0.5 to Vcc+0.5	V	
DC output diode current	I_{OK}	–50	mA	V_O = –0.5V
		50	mA	V_O = Vcc+0.5V
DC output voltage	V_O	–0.5 to Vcc+0.5	V	
DC output source or sink current	I_O	±50	mA	
DC V_{CC} or ground current per output pin	I_{CC}, I_{GND}	±50	mA	
Storage temperature	Tstg	–65 to +150	°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	Ta	–40 to +85	°C	
Input rise and fall time (except Schmitt inputs) V_{IN} 30% to 70% V_{CC}	tr, tf	8	ns/V	V_{CC} = 3.0V
				V_{CC} = 4.5 V
				V_{CC} = 5.5 V

DC Characteristics

Item	Sym-bol	Vcc (V)	Ta = 25°C			Ta = –40 to +85°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 µA	
		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 µA	
		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	—	—	±0.1	—	±1.0	µA	V_{IN} = 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	µA	V_{IN} = V_{CC} or ground	

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

AC Characteristics: HD74AC157

Item	Symbol	V_{CC} (V)*[1]	Ta = +25°C C_L = 50 pF			Ta = –40°C to +85°C C_L = 50 pF		Unit
			Min	Typ	Max	Min	Max	
Propagation delay S to Z_n	t_{PLH}	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_n	t_{PHL}	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 $\overline{E}$ to Z_n	t_{PLH}	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 $\overline{E}$ to Z_n	t_{PHL}	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_n to Z_n	t_{PLH}	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_n to Z_n	t_{PHL}	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

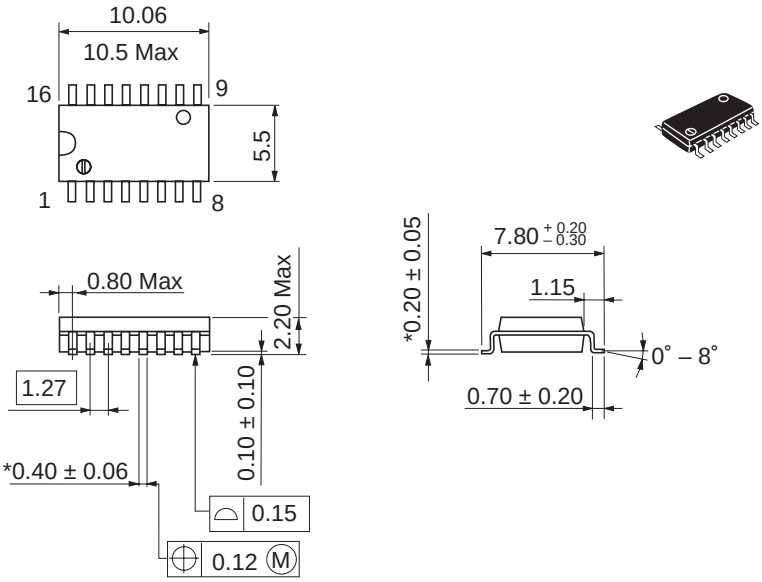
Capacitance

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

Package Dimensions

As of January, 2003

Unit: mm

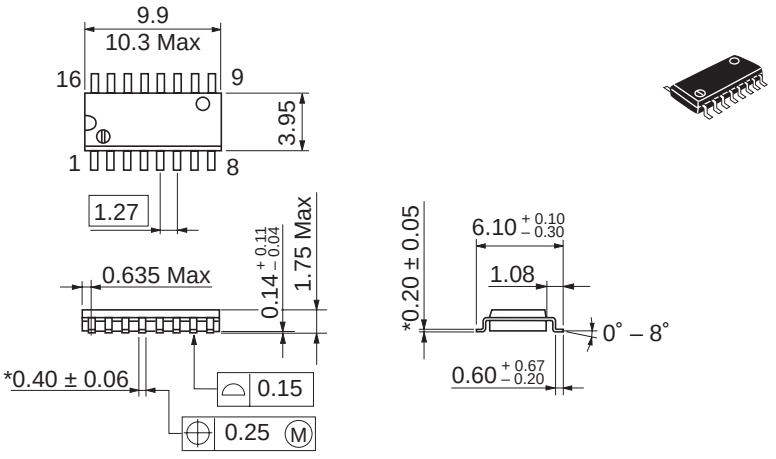


Package Code	FP-16DAV
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.24 g

*Ni/Pd/Au plating

As of January, 2003

Unit: mm

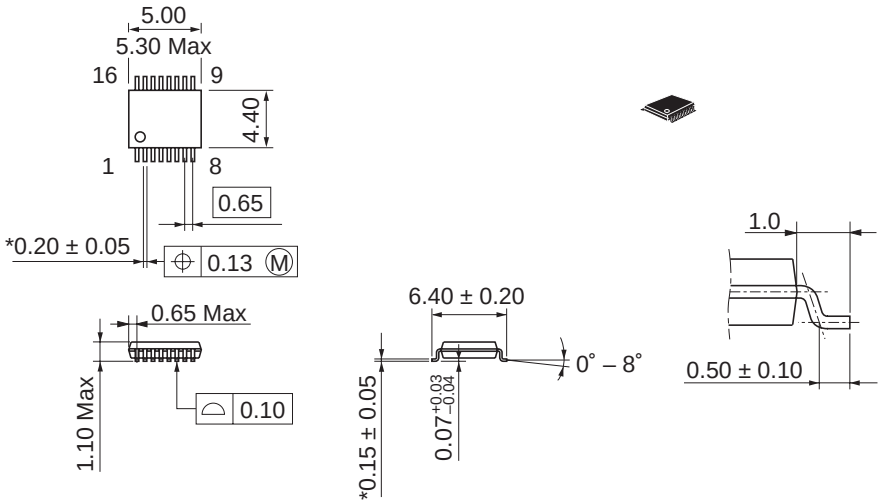


Package Code	FP-16DNV
JEDEC	Conforms
JEITA	Conforms
Mass (reference value)	0.15 g

*Ni/Pd/Au plating

As of January, 2003

Unit: mm



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

*Ni/Pd/Au plating

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