

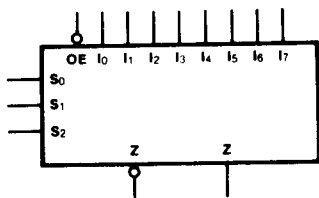
HD74AC251/HD74ACT251 • 8-Input Multiplexer with 3-State Output.

Description

The HD74AC251/HD74ACT251 is a high-speed 8-input digital multiplexer. It provides, in one package, the ability to select one bit of data from up to eight sources. It can be used as universal function generator to generate any logic function of four variables. Both true and complementary outputs are provided.

- Multifunctional Capability
- On-Chip Select Logic Decoding
- Inverting and Noninverting 3-State Outputs
- Outputs Source/Sink 24 mA
- HD74ACT251 has TTL-Compatible Inputs

Logic Symbol



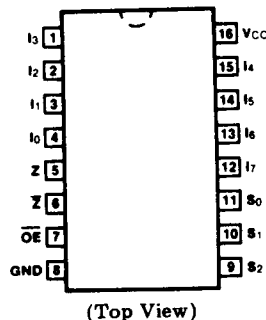
Functional Description

This device is a logical implementation of a single-pole, 8-position switch with the switch position controlled by the state of three Select inputs, S_0 , S_1 , S_2 . Both true and complementary outputs are provided. The Output Enable input ($\overline{OE}$) is active Low. When it is activated, the logic function provided at the output is:

$$Z = \overline{OE} \cdot (I_0 \cdot \overline{S_0} \cdot \overline{S_1} \cdot \overline{S_2} + I_1 \cdot \overline{S_0} \cdot \overline{S_1} \cdot S_2 + I_2 \cdot \overline{S_0} \cdot S_1 \cdot \overline{S_2} + I_3 \cdot \overline{S_0} \cdot S_1 \cdot S_2 + I_4 \cdot S_0 \cdot \overline{S_1} \cdot \overline{S_2} + I_5 \cdot S_0 \cdot \overline{S_1} \cdot S_2 + I_6 \cdot S_0 \cdot S_1 \cdot \overline{S_2} + I_7 \cdot S_0 \cdot S_1 \cdot S_2)$$

When the Output Enable is High, both outputs are in the high impedance (High Z) state. This feature allows multiplexer expansion by tying the outputs of up to 128 devices together. When the outputs of the 3-state devices are tied together, all but one device must be in the high impedance state to avoid high currents that would exceed the maximum ratings. The Output Enable signals should be designed to ensure there is no overlap in the active-Low portion of the enable voltages.

Pin Assignment



Pin Names

- S_0 — S_2 Select Inputs
- $\overline{OE}$ 3-State Output Enable Input
- I_0 — I_7 Multiplexer Inputs
- Z 3-State Multiplexer Output
- $\overline{Z}$ Complementary 3-State Multiplexer Output

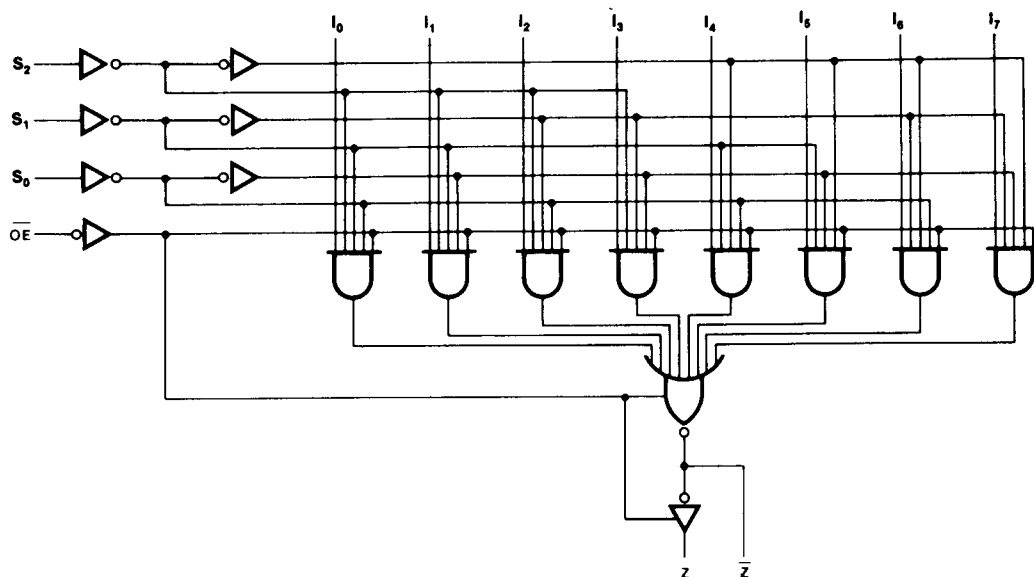
Truth Table

Inputs				Outputs	
$\overline{OE}$	S_2	S_1	S_0	$\overline{Z}$	Z
H	X	X	X	Z	Z
L	L	L	L	$\overline{I_0}$	I_0
L	L	L	H	$\overline{I_1}$	I_1
L	L	H	L	$\overline{I_2}$	I_2
L	L	H	H	$\overline{I_3}$	I_3
L	H	L	L	$\overline{I_4}$	I_4
L	H	L	H	$\overline{I_5}$	I_5
L	H	H	L	$\overline{I_6}$	I_6
L	H	H	H	$\overline{I_7}$	I_7

H = High Voltage Level
L = Low Voltage Level
X = Immaterial
Z = High Impedance

HD74AC251/HD74ACT251

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.

DC Characteristics (unless otherwise specified)

Symbol	Parameter	Max	Unit	Condition
I_{CC}	Maximum Quiescent Supply Current	80	μA	$V_{IN} = V_{CC}$ or Ground, $V_{CC} = 5.5V$, $T_a = \text{Worst Case}$
I_{CC}	Maximum Quiescent Supply Current	8.0	μA	$V_{IN} = V_{CC}$ or Ground, $V_{CC} = 5.5V$, $T_a = 25^\circ C$
I_{CCT}	Maximum Additional I_{CC} /Input (HD74ACT251)	1.5	mA	$V_{IN} = V_{CC} - 2.1V$, $V_{CC} = 5.5V$, $T_a = \text{Worst Case}$

AC Characteristics: HD74AC251

Symbol	Parameter	V _{CC} * (V)	T _a = +25°C C _L = 50pF			T _a = -40°C to +85°C C _L = 50pF		Unit
			Min	Typ	Max	Min	Max	
t _{PLH}	Propagation Delay S _n to Z or $\bar{Z}$	3.3 5.0	1.0 1.0	11.5 8.5	17.5 12.5	1.0 1.0	19.0 13.5	ns
t _{PHL}	Propagation Delay S _n to Z or $\bar{Z}$	3.3 5.0	1.0 1.0	11.0 8.0	17.5 12.5	1.0 1.0	19.0 13.5	ns
t _{PLH}	Propagation Delay In to Z or $\bar{Z}$	3.3 5.0	1.0 1.0	10.0 7.0	14.0 10.0	1.0 1.0	15.5 11.0	ns
t _{PHL}	Propagation Delay In to Z or $\bar{Z}$	3.3 5.0	1.0 1.0	9.0 6.5	14.0 10.0	1.0 1.0	15.5 11.0	ns
t _{PZH}	Output Enable Time OE to Z or $\bar{Z}$	3.3 5.0	1.0 1.0	7.5 5.5	11.0 8.0	1.0 1.0	12.0 9.0	ns
t _{PZL}	Output Enable Time OE to Z or $\bar{Z}$	3.3 5.0	1.0 1.0	7.5 5.5	11.0 8.0	1.0 1.0	12.0 9.0	ns
t _{PHZ}	Output Disable Time OE to Z or $\bar{Z}$	3.3 5.0	3.5 2.5	8.5 7.0	11.5 9.6	3.5 2.5	13.0 10.0	ns
t _{PLZ}	Output Disable Time OE to Z or $\bar{Z}$	3.3 5.0	4.0 3.0	7.0 5.5	11.0 8.0	4.0 3.0	12.0 8.5	ns

*Voltage Range 3.3 is 3.3V ± 0.3V
Voltage Range 5.0 is 5.0V ± 0.5V

AC Characteristics: HD74ACT251

Symbol	Parameter	V _{CC} * (V)	T _a = +25°C C _L = 50pF			T _a = -40°C to +85°C C _L = 50pF		Unit
			Min	Typ	Max	Min	Max	
t _{PLH}	Propagation Delay S _n to Z or $\bar{Z}$	5.0	1.0	7.0	13.5	1.0	13.0	ns
t _{PHL}	Propagation Delay S _n to Z or $\bar{Z}$	5.0	1.0	7.5	13.0	1.0	14.5	ns
t _{PLH}	Propagation Delay In to Z or $\bar{Z}$	5.0	1.0	5.5	10.0	1.0	10.5	ns
t _{PHL}	Propagation Delay In to Z or $\bar{Z}$	5.0	1.0	6.5	10.5	1.0	12.0	ns
t _{PZH}	Output Enable Time $\overline{OE}$ to Z or $\bar{Z}$	5.0	1.0	5.0	9.0	1.0	9.0	ns
t _{PZL}	Output Enable Time $\overline{OE}$ to Z or $\bar{Z}$	5.0	1.0	4.5	9.0	1.0	8.5	ns
t _{PHZ}	Output Disable Time $\overline{OE}$ to Z or $\bar{Z}$	5.0	1.0	6.0	10.5	1.0	10.0	ns
t _{PLZ}	Output Disable Time $\overline{OE}$ to Z or $\bar{Z}$	5.0	1.0	4.5	9.0	1.0	8.5	ns

*Voltage Range 5.0 is 5.0V ± 0.5V

Capacitance

Symbol	Parameter	Typ	Unit	Condition
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = 5.5V
C _{PD}	Power Dissipation Capacitance	70.0	pF	V _{CC} = 5.0V

Package Information

In the HD74AC series of Advanced CMOS logic, either plastic DIP and small outline packages can be selected.

To order, please refer to the following package code.

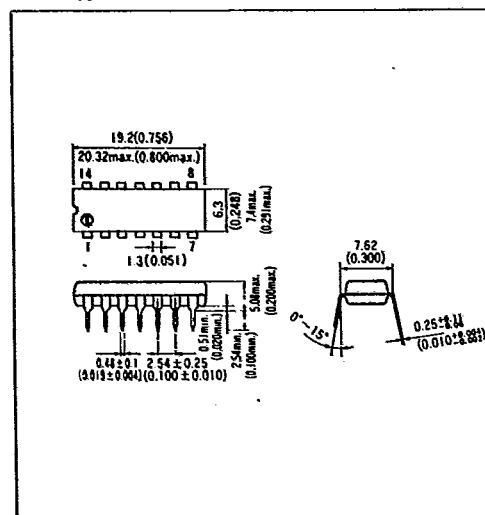
• Package code of Advanced CMOS Logic

HD74AC XXXX P

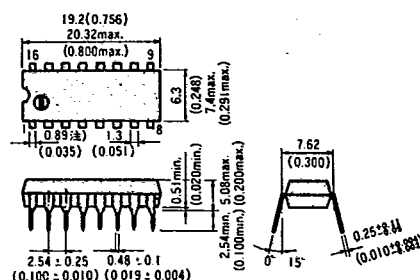
Package code
 P: Plastic DIP,
 FP: Small outline package
 Individual device code
 74AC: Commercial FACT
 74ACT: Commercial
 TTL-Compatible
 Advanced CMOS
 Initial cad of Hitachi
 digital IC

Plastic DIP Package [Unit: mm (inch)]

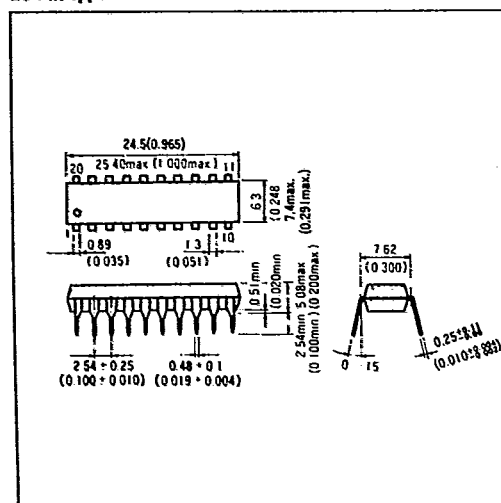
14 Pin type



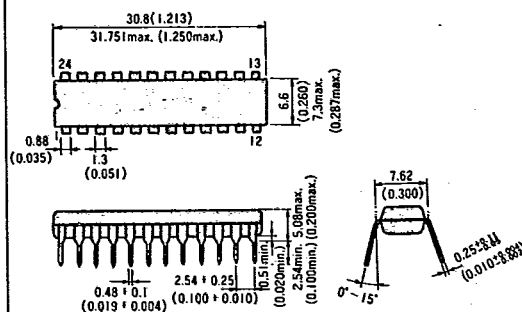
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20 Pin type



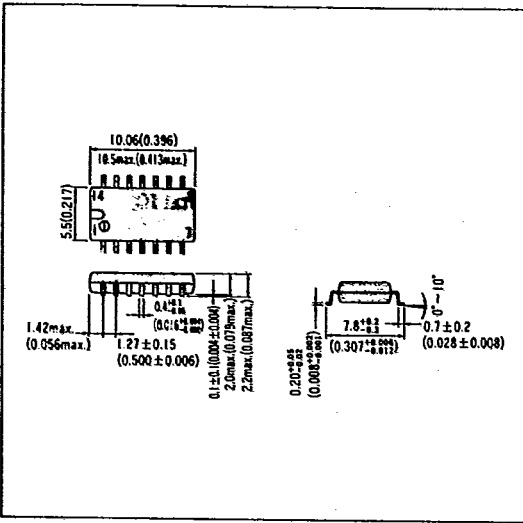
24 Pin type



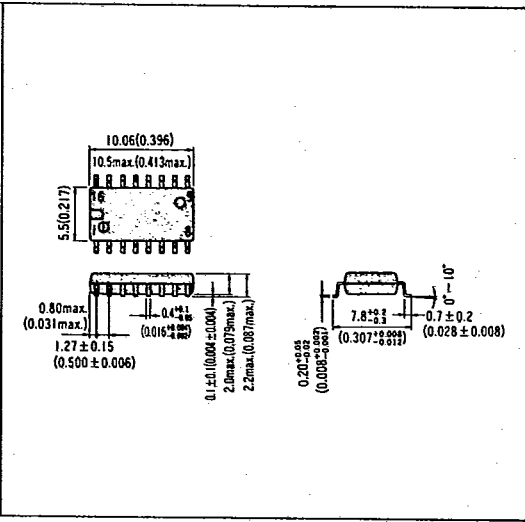
Package Information

Small Outline Package [Unit: mm (inch)]

14 Pin type



16 Pin type



20 Pin type

