



**MOTOROLA**

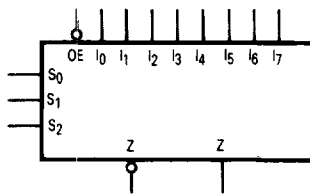
*Product Preview*

**8-Input Multiplexer  
with 3-State Outputs**

The MC74AC251/74ACT251 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 a 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
- 'ACT251 Has TTL Compatible Inputs

**LOGIC SYMBOL**



**PIN NAMES**

- S<sub>0</sub>-S<sub>2</sub> Select Inputs
- OE 3-State Output Enable Input
- I<sub>0</sub>-I<sub>7</sub> Multiplexer Inputs
- Z 3-State Multiplexer Output
- Z̄ Complementary 3-State Multiplexer Output

**TRUTH TABLE**

Inputs				Outputs	
OE	S <sub>2</sub>	S <sub>1</sub>	S <sub>0</sub>	Z̄	Z
H	X	X	X	Z	Z
L	L	L	L	I <sub>0</sub>	I <sub>0</sub>
L	L	L	H	I <sub>1</sub>	I <sub>1</sub>
L	L	H	L	I <sub>2</sub>	I <sub>2</sub>
L	L	H	H	I <sub>3</sub>	I <sub>3</sub>
L	H	L	L	I <sub>4</sub>	I <sub>4</sub>
L	H	L	H	I <sub>5</sub>	I <sub>5</sub>
L	H	H	L	I <sub>6</sub>	I <sub>6</sub>
L	H	H	H	I <sub>7</sub>	I <sub>7</sub>

H = HIGH Voltage Level  
L = LOW Voltage Level  
X = Immaterial  
Z = High Impedance

**MC74AC251  
MC74ACT251**

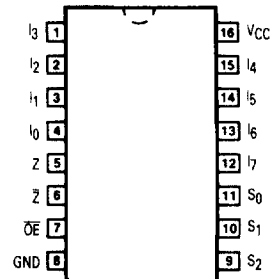
**8-INPUT  
MULTIPLEXER WITH  
3-STATE OUTPUTS**



**N SUFFIX  
CASE 648-08  
PLASTIC**



**D SUFFIX  
CASE 751B-03  
PLASTIC**



5

This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.

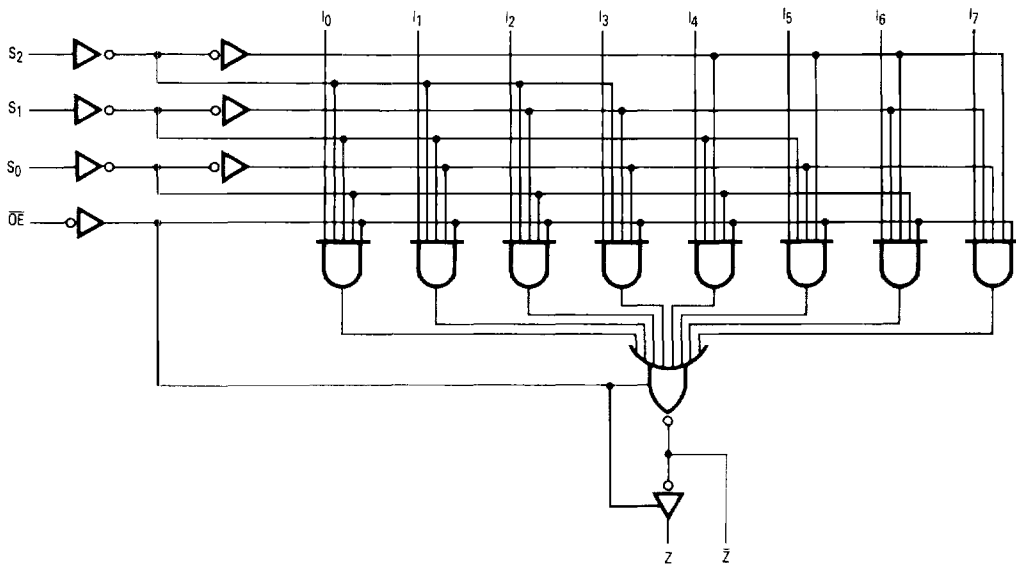
**FUNCTIONAL DESCRIPTION**

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:

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

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.

**LOGIC DIAGRAM**



5

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

**MC74AC251 • MC74ACT251**

**DC CHARACTERISTICS** (unless otherwise specified)

Symbol	Parameter	Value	Units	Test Conditions
I <sub>CC</sub>	Maximum Quiescent Supply Current	80	μA	V <sub>IN</sub> = V <sub>CC</sub> or Ground, V <sub>CC</sub> = 5.5 V, T <sub>A</sub> = Worst Case
I <sub>CC</sub>	Maximum Quiescent Supply Current	8.0	μA	V <sub>IN</sub> = V <sub>CC</sub> or Ground, V <sub>CC</sub> = 5.5 V, T <sub>A</sub> = 25°C
I <sub>CC(T)</sub>	Maximum Additional I <sub>CC</sub> /Input (*ACT251)	1.5	mA	V <sub>IN</sub> = V <sub>CC</sub> - 2.1 V, V <sub>CC</sub> = 5.5 V, T <sub>A</sub> = Worst Case

**AC CHARACTERISTICS** (For Figures and Waveforms — See Section 3)

Symbol	Parameter	V <sub>CC</sub> * (V)	74AC			74AC		Units	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Min	Typ	Max	Min	Max		
t <sub>PLH</sub>	Propagation Delay S <sub>N</sub> 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 13.5	ns	3-6
t <sub>PHL</sub>	Propagation Delay S <sub>N</sub> to Z or $\bar{Z}$	3.3 5.0	1.0 1.0	11 8.0	17.5 12.5	1.0 1.0	19 13.5	ns	3-6
t <sub>PLH</sub>	Propagation Delay I <sub>n</sub> to Z or $\bar{Z}$	3.3 5.0	1.0 1.0	10 7.0	14 10	1.0 1.0	15.5 11	ns	3-5
t <sub>PHL</sub>	Propagation Delay I <sub>n</sub> to Z or $\bar{Z}$	3.3 5.0	1.0 1.0	9.0 6.5	14 10	1.0 1.0	15.5 11	ns	3-5
t <sub>PZH</sub>	Output Enable Time $\bar{O}E$ to Z or $\bar{Z}$	3.3 5.0	1.0 1.0	7.5 5.5	11 8.0	1.0 1.0	12 9.0	ns	3-7
t <sub>PZL</sub>	Output Enable Time $\bar{O}E$ to Z or $\bar{Z}$	3.3 5.0	1.0 1.0	7.5 5.5	11 8.0	1.0 1.0	12 9.0	ns	3-8
t <sub>PHZ</sub>	Output Disable Time $\bar{O}E$ to Z or $\bar{Z}$	3.3 5.0	3.5 2.5	8.5 7.0	11.5 9.5	3.5 2.5	13 10	ns	3-7
t <sub>PLZ</sub>	Output Disable Time $\bar{O}E$ to Z or $\bar{Z}$	3.3 5.0	4.0 3.0	7.0 5.5	11 8.0	4.0 3.0	12 8.5	ns	3-8

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

**MC74AC251 • MC74ACT251**

**AC CHARACTERISTICS** (For Figures and Waveforms — See Section 3)

Symbol	Parameter	V <sub>CC</sub> * (V)	74ACT			74ACT		Units	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Min	Typ	Max	Min	Max		
t <sub>PLH</sub>	Propagation Delay S <sub>F</sub> to Z or $\bar{Z}$	5.0	1.0	7.0	13.5	1.0	13	ns	3-6
t <sub>PHL</sub>	Propagation Delay S <sub>H</sub> to Z or $\bar{Z}$	5.0	1.0	7.5	13	1.0	14.5	ns	3-6
t <sub>PLH</sub>	Propagation Delay I <sub>H</sub> to Z or $\bar{Z}$	5.0	1.0	5.5	10	1.0	10.5	ns	3-5
t <sub>PHL</sub>	Propagation Delay I <sub>H</sub> to Z or $\bar{Z}$	5.0	1.0	6.5	10.5	1.0	12	ns	3-5
t <sub>PZH</sub>	Output Enable Time $\bar{O}E$ to Z or $\bar{Z}$	5.0	1.0	5.0	9.0	1.0	9.0	ns	3-7
t <sub>PZL</sub>	Output Enable Time $\bar{O}E$ to Z or $\bar{Z}$	5.0	1.0	4.5	9.0	1.0	8.5	ns	3-8
t <sub>PHZ</sub>	Output Disable Time $\bar{O}E$ to Z or $\bar{Z}$	5.0	1.0	6.0	10.5	1.0	10	ns	3-7
t <sub>PLZ</sub>	Output Disable Time $\bar{O}E$ to Z or $\bar{Z}$	5.0	1.0	4.5	9.0	1.0	8.5	ns	3-8

\*Voltage Range 5.0 is 5.0 V - 0.5 V

**CAPACITANCE**

Symbol	Parameter	Value Typ	Units	Test Conditions
C <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = 5.0 V
CPD	Power Dissipation Capacitance	70	pF	V <sub>CC</sub> = 5.0 V