

# 54AC/74AC151 • 54ACT/74ACT151

## 1-of-8 Decoder/Demultiplexer

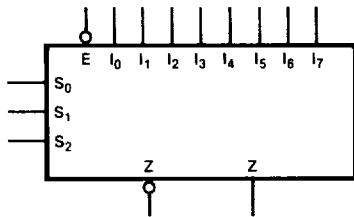
### Description

The 'AC/'ACT151 is a high-speed 8-input digital multiplexer. It provides, in one package, the ability to select one line of data from up to eight sources. The 'AC/'ACT151 can be used as a universal function generator to generate any logic function of four variables. Both true and complementary outputs are provided.

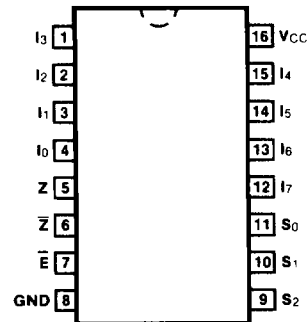
- Outputs Source/Sink 24 mA
- 'ACT151 has TTL-Compatible Inputs

**Ordering Code:** See Section 6

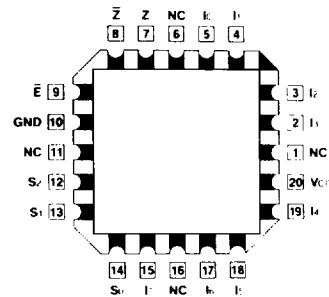
### Logic Symbol



### Connection Diagrams



### Pin Assignment for DIP, Flatpak and SOIC



### Pin Assignment for LCC

### Truth Table

Inputs				Outputs	
E	S <sub>2</sub>	S <sub>1</sub>	S <sub>0</sub>	Z	Z
H	X	X	X	H	L
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

### Pin Names

- I<sub>0</sub> - I<sub>7</sub> Data Inputs
- S<sub>0</sub> - S<sub>2</sub> Select Inputs
- E Enable Input
- Z Data Output
- Z-bar Inverted Data Output

# AC151 • ACT151

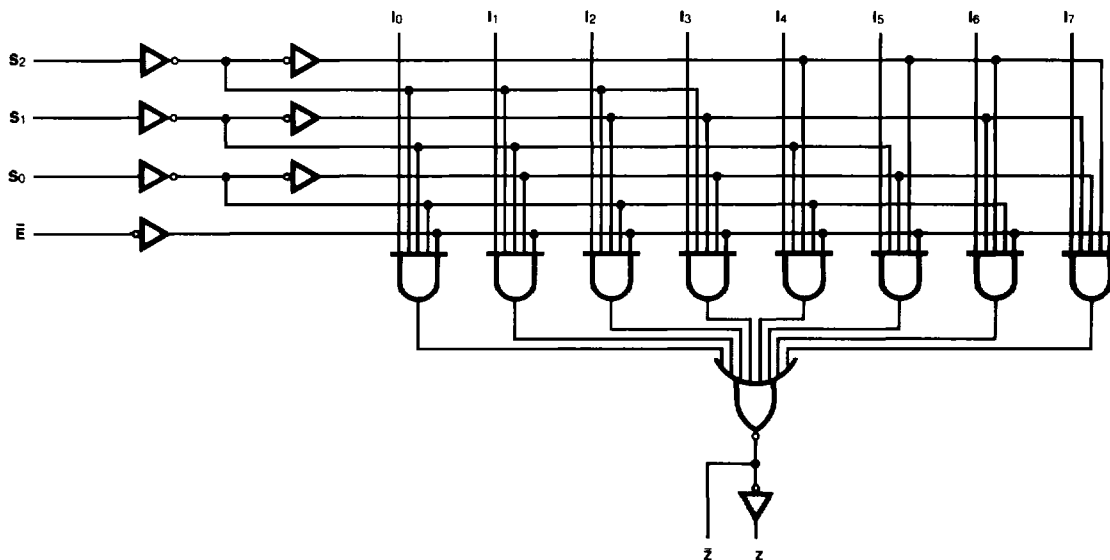
## Functional Description

The 'AC/ACT151 is a logic 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 Enable input ( $\bar{E}$ ) is active LOW. When it is not activated, the complementary output is HIGH and the true output is LOW regardless of all other inputs. The logic function provided at the output is:

$$Z = \bar{E} \cdot (I_0 \cdot \bar{S}_0 \cdot \bar{S}_1 \cdot \bar{S}_2 + I_1 \cdot S_0 \cdot \bar{S}_1 \cdot \bar{S}_2 + I_2 \cdot \bar{S}_0 \cdot S_1 \cdot \bar{S}_2 + I_3 \cdot S_0 \cdot S_1 \cdot \bar{S}_2 + I_4 \cdot \bar{S}_0 \cdot \bar{S}_1 \cdot S_2 + I_5 \cdot S_0 \cdot \bar{S}_1 \cdot S_2 + I_6 \cdot \bar{S}_0 \cdot S_1 \cdot S_2 + I_7 \cdot S_0 \cdot S_1 \cdot S_2)$$

The 'AC/ACT151 provides the ability, in one package, to select from eight sources of data or control information. By proper manipulation of the inputs, the 'AC/ACT151 can provide any logic function of four variables and its complement.

## 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	54AC/ACT	74AC/ACT	Units	Conditions
I <sub>CC</sub>	Maximum Quiescent Supply Current	160	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	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 ('ACT151)	1.6	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

Symbol	Parameter	V <sub>CC</sub> * (V)	74AC			54AC		74AC		Units	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -55°C to +125°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	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	18.0 13.0	1.0 1.0	22.0 15.5	1.0 1.0	20.0 15.0	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	12.0 8.5	18.0 13.0	1.0 1.0	22.0 15.5	1.0 1.0	20.0 15.0	ns	3-6
t <sub>PLH</sub>	Propagation Delay E to Z or $\bar{Z}$	3.3 5.0	1.0 1.0	8.0 6.0	13.0 10.0	1.0 1.0	15.5 12.0	1.0 1.0	14.0 11.0	ns	3-6
t <sub>PHL</sub>	Propagation Delay E to Z or $\bar{Z}$	3.3 5.0	1.0 1.0	8.5 6.5	13.0 10.0	1.0 1.0	15.5 12.0	1.0 1.0	14.0 11.0	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	9.5 7.0	14.0 10.5	1.0 1.0	16.0 12.0	1.0 1.0	15.5 11.0	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	9.5 7.0	15.0 11.0	1.0 1.0	18.0 13.0	1.0 1.0	16.0 12.0	ns	3-5

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

Military parameters given herein are for general references only. For current military specifications and subgroup testing information please request Fairchild's Table I data sheet from your Fairchild sales engineer or account representative.

## AC Characteristics

Symbol	Parameter	V <sub>CC</sub> * (V)	74ACT			54ACT		74ACT		Units	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -55°C to +125°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	Min	Max		
t <sub>PLH</sub>	Propagation Delay S <sub>n</sub> to Z	5.0	1.0	12.5	15.5			1.0	17.0	ns	3-6
t <sub>PHL</sub>	Propagation Delay S <sub>n</sub> to Z	5.0	1.0	12.5	15.5			1.0	16.5	ns	3-6
t <sub>PLH</sub>	Propagation Delay S <sub>n</sub> to Z̄	5.0	1.0	12.5	15.0			1.0	16.5	ns	3-6
t <sub>PHL</sub>	Propagation Delay S <sub>n</sub> to Z̄	5.0	1.0	12.5	16.5			1.0	18.5	ns	3-6
t <sub>PLH</sub>	Propagation Delay E to Z	5.0	1.0	10.0	9.5			1.0	10.0	ns	3-6
t <sub>PHL</sub>	Propagation Delay E to Z	5.0	1.0	10.5	9.0			1.0	10.0	ns	3-6
t <sub>PLH</sub>	Propagation Delay E to Z̄	5.0	1.0	10.0	8.5			1.0	9.5	ns	3-6
t <sub>PHL</sub>	Propagation Delay E to Z̄	5.0	1.0	10.5	10.0			1.0	10.5	ns	3-6
t <sub>PLH</sub>	Propagation Delay I <sub>n</sub> to Z	5.0	1.0	11.0	11.5			1.0	12.5	ns	3-6
t <sub>PHL</sub>	Propagation Delay I <sub>n</sub> to Z	5.0	1.0	11.0	12.0			1.0	13.5	ns	3-6
t <sub>PLH</sub>	Propagation Delay I <sub>n</sub> to Z̄	5.0	1.0	11.0	12.0			1.0	13.0	ns	3-6
t <sub>PHL</sub>	Propagation Delay I <sub>n</sub> to Z̄	5.0	1.0	11.0	12.5			1.0	14.0	ns	3-6

\*Voltage Range 5.0 is 5.0 V ± 0.5 V

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## Capacitance

Symbol	Parameter	54/74AC/ACT	Units	Conditions
		Typ		
C <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = 5.5 V
C <sub>PD</sub>	Power Dissipation Capacitance	70.0	pF	V <sub>CC</sub> = 5.5 V