54AC/74AC151 • 54ACT/74ACT151
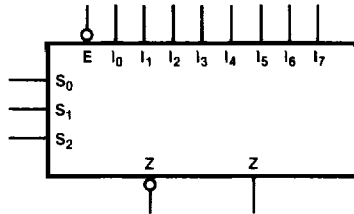
1-of-8 Decoder/Demultiplexer

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
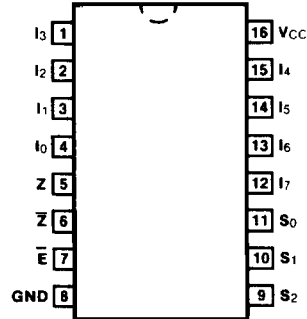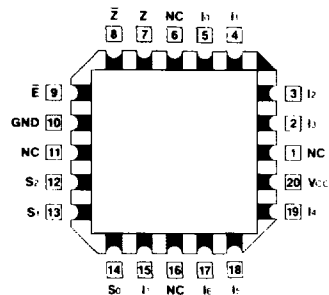
Ordering Code: See Section 6

Logic Symbol

Connection Diagrams

**Pin Assignment
for DIP, Flatpak and SOIC**

**Pin Assignment
for LCC**

Pin Names

I_0 - I_7	Data Inputs
S_0 - S_2	Select Inputs
$\bar{E}$	Enable Input
Z	Data Output
$\bar{Z}$	Inverted Data Output

Truth Table

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

H = HIGH Voltage Level
L = LOW Voltage Level
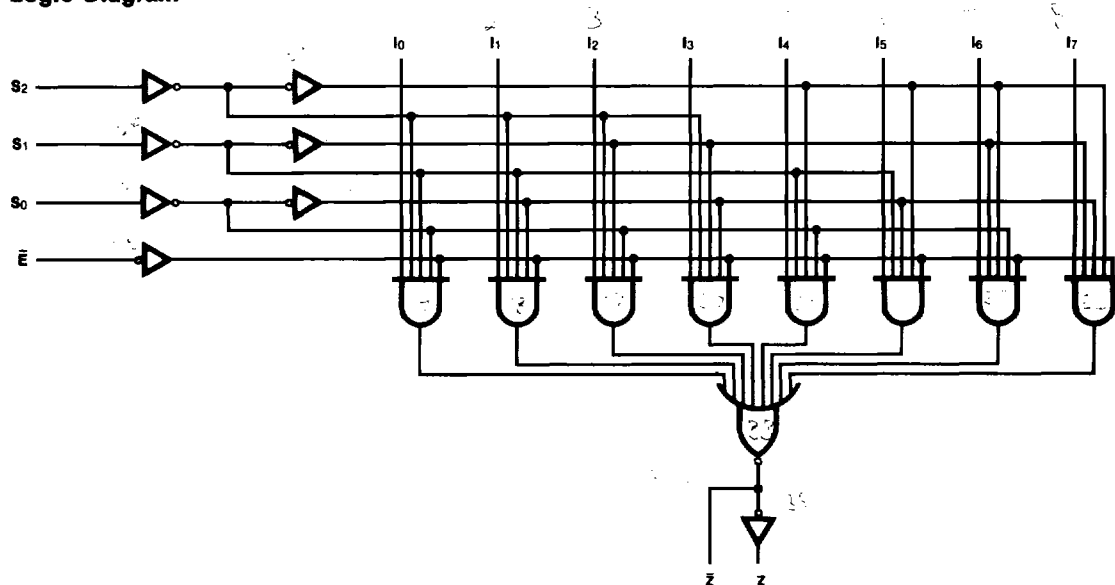X = Immaterial

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 ($\overline{E}$) 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:

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.

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

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
Icc	Maximum Quiescent Supply Current	160	80	μA	$V_{IN} = V_{CC}$ or Ground, $V_{CC} = 5.5$ V, $T_A =$ Worst Case
Icc	Maximum Quiescent Supply Current	8.0	8.0	μA	$V_{IN} = V_{CC}$ or Ground, $V_{CC} = 5.5$ V, $T_A = 25$°C
Icct	Maximum Additional Icc/Input ('ACT151)	1.6	1.5	mA	$V_{IN} = V_{CC} - 2.1$ V $V_{CC} = 5.5$ V, $T_A =$ Worst Case

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AC Characteristics

Symbol	Parameter	Vcc* (V)	74AC $T_A = +25$°C $C_L = 50$ pF			54AC $T_A = -55$°C to $+125$°C $C_L = 50$ pF		74AC $T_A = -40$°C to $+85$°C $C_L = 50$ pF		Units	Fig. No.
			Min	Typ	Max	Min	Max	Min	Max		
tPLH	Propagation Delay Sn to Z or Z̄	3.3	1.0	11.5	18.0	1.0	22.0	1.0	20.0	ns	3-6
		5.0	1.0	8.5	13.0	1.0	15.5	1.0	15.0		
tPHL	Propagation Delay Sn to Z or Z̄	3.3	1.0	12.0	18.0	1.0	22.0	1.0	20.0	ns	3-6
		5.0	1.0	8.5	13.0	1.0	15.5	1.0	15.0		
tPLH	Propagation Delay E to Z or Z̄	3.3	1.0	8.0	13.0	1.0	15.5	1.0	14.0	ns	3-6
		5.0	1.0	6.0	10.0	1.0	12.0	1.0	11.0		
tPHL	Propagation Delay E to Z or Z̄	3.3	1.0	8.5	13.0	1.0	15.5	1.0	14.0	ns	3-6
		5.0	1.0	6.5	10.0	1.0	12.0	1.0	11.0		
tPLH	Propagation Delay In to Z or Z̄	3.3	1.0	9.5	14.0	1.0	16.0	1.0	15.5	ns	3-5
		5.0	1.0	7.0	10.5	1.0	12.0	1.0	11.0		
tPHL	Propagation Delay In to Z or Z̄	3.3	1.0	9.5	15.0	1.0	18.0	1.0	16.0	ns	3-5
		5.0	1.0	7.0	11.0	1.0	13.0	1.0	12.0		

*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.

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AC Characteristics

Symbol	Parameter	Vcc* (V)	74ACT TA = +25°C CL = 50 pF			54ACT TA = −55°C to +125°C CL = 50 pF		74ACT TA = −40°C to +85°C CL = 50 pF		Units	Fig. No.
			Min	Typ	Max	Min	Max	Min	Max		
t_{PLH}	Propagation Delay S_n to Z	5.0	1.0	12.5	15.5			1.0	17.0	ns	3-6
t_{PHL}	Propagation Delay S_n to Z	5.0	1.0	12.5	15.5			1.0	16.5	ns	3-6
t_{PLH}	Propagation Delay S_n to $\overline{Z}$	5.0	1.0	12.5	15.0			1.0	16.5	ns	3-6
t_{PHL}	Propagation Delay S_n to $\overline{Z}$	5.0	1.0	12.5	16.5			1.0	18.5	ns	3-6
t_{PLH}	Propagation Delay $\overline{E}$ to Z	5.0	1.0	10.0	9.5			1.0	10.0	ns	3-6
t_{PHL}	Propagation Delay $\overline{E}$ to Z	5.0	1.0	10.5	9.0			1.0	10.0	ns	3-6
t_{PLH}	Propagation Delay $\overline{E}$ to $\overline{Z}$	5.0	1.0	10.0	8.5			1.0	9.5	ns	3-6
t_{PHL}	Propagation Delay $\overline{E}$ to $\overline{Z}$	5.0	1.0	10.5	10.0			1.0	10.5	ns	3-6
t_{PLH}	Propagation Delay I_n to Z	5.0	1.0	11.0	11.5			1.0	12.5	ns	3-6
t_{PHL}	Propagation Delay I_n to Z	5.0	1.0	11.0	12.0			1.0	13.5	ns	3-6
t_{PLH}	Propagation Delay I_n to $\overline{Z}$	5.0	1.0	11.0	12.0			1.0	13.0	ns	3-6
t_{PHL}	Propagation Delay I_n to $\overline{Z}$	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

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.

Capacitance

Symbol	Parameter	54/74AC/ACT Typ	Units	Conditions
C_{IN}	Input Capacitance	4.5	pF	Vcc = 5.5 V
C_{PD}	Power Dissipation Capacitance	70.0	pF	Vcc = 5.5 V