

54AC/74AC139 • 54ACT/74ACT139

Dual 1-of-4 Decoder/Demultiplexer

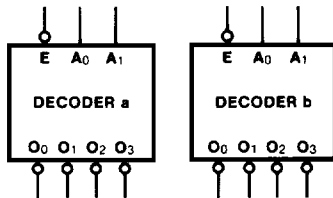
Description

The 'AC/'ACT139 is a high-speed, dual 1-of-4 decoder/demultiplexer. The device has two independent decoders, each accepting two inputs and providing four mutually-exclusive active-LOW outputs. Each decoder has an active-LOW Enable input which can be used as a data input for a 4-output demultiplexer. Each half of the 'AC/'ACT139 can be used as a function generator providing all four minterms of two variables.

- Multifunction Capability
- Two Completely Independent 1-of-4 Decoders
- Active LOW Mutually Exclusive Outputs
- Outputs Source/Sink 24 mA
- 'ACT139 has TTL-Compatible Inputs

Ordering Code: See Section 6

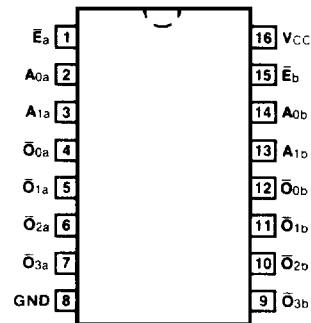
Logic Symbol



Pin Names

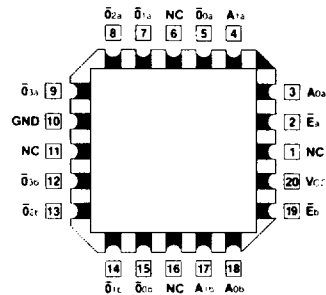
- A₀, A₁ Address Inputs
- \bar{E} Enable Inputs
- $\bar{O}_0 - \bar{O}_3$ Outputs

Connection Diagrams



Pin Assignment for DIP, Flatpak and SOIC

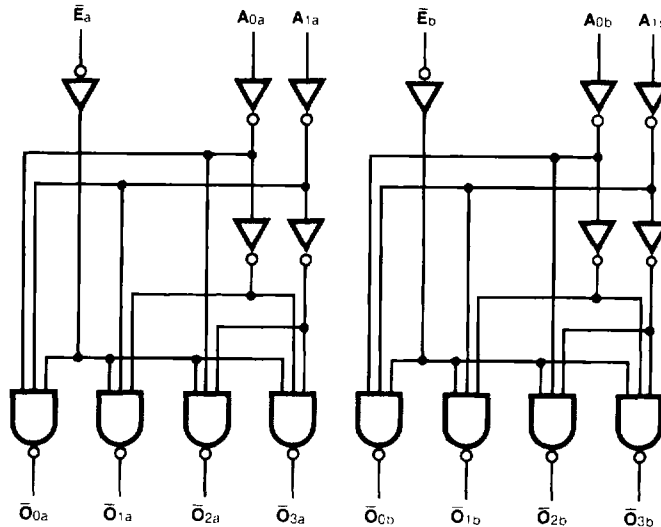
5



Pin Assignment for LCC

AC139 • ACT139

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.

Functional Description

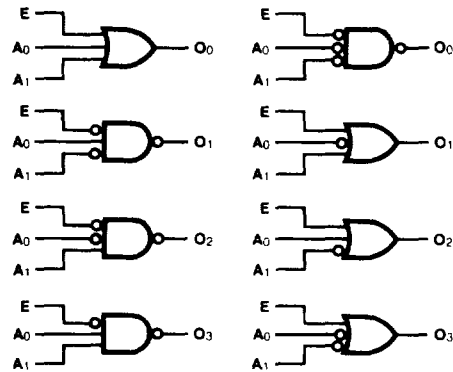
The 'AC/ACT139 is a high-speed dual 1-of-4 decoder/demultiplexer. The device has two independent decoders, each of which accepts two binary weighted inputs ($A_0 - A_1$) and provides four mutually exclusive active-LOW outputs ($\bar{O}_0 - \bar{O}_3$). Each decoder has an active-LOW enable (\bar{E}). When \bar{E} is HIGH all outputs are forced HIGH. The enable can be used as the data input for a 4-output demultiplexer application. Each half of the 'AC/ACT139 generates all four minterms of two variables. These four minterms are useful in some applications, replacing multiple gate functions as shown in Figure a, and thereby reducing the number of packages required in a logic network.

Truth Table

Inputs			Outputs			
\bar{E}	A_0	A_1	\bar{O}_0	\bar{O}_1	\bar{O}_2	\bar{O}_3
H	X	X	H	H	H	H
L	L	L	L	H	H	H
L	H	L	H	L	H	H
L	L	H	H	H	L	H
L	H	H	H	H	H	L

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

Figure a: Gate Functions (each half)



DC Characteristics (unless otherwise specified)

Symbol	Parameter	54AC/ACT	74AC/ACT	Units	Conditions
I _{CC}	Maximum Quiescent Supply Current	160	80	μA	V _{IN} = V _{CC} or Ground, V _{CC} = 5.5 V, T _A = Worst Case
I _{CC}	Maximum Quiescent Supply Current	8.0	8.0	μA	V _{IN} = V _{CC} or Ground, V _{CC} = 5.5 V, T _A = 25°C
I _{CC(T)}	Maximum Additional I _{CC} /Input (ACT139)	1.6	1.5	mA	V _{IN} = V _{CC} - 2.1 V V _{CC} = 5.5 V, T _A = Worst Case

AC Characteristics

Symbol	Parameter	V _{CC} * (V)	74AC			54AC		74AC		Units	Fig. No.
			T _A = +25°C C _L = 50 pF			T _A = -55°C to +125°C C _L = 50 pF		T _A = -40°C to +85°C C _L = 50 pF			
			Min	Typ	Max	Min	Max	Min	Max		
t _{PLH}	Propagation Delay A _n to \bar{O}_n	3.3 5.0	1.0 1.0	8.0 6.5	11.5 8.5	1.0 1.0	14.5 11.0	1.0 1.0	13.0 9.5	ns	3-6
t _{PHL}	Propagation Delay A _n to \bar{O}_n	3.3 5.0	1.0 1.0	7.0 5.5	10.0 7.5	1.0 1.0	12.5 10.0	1.0 1.0	11.0 8.5	ns	3-6
t _{PLH}	Propagation Delay \bar{E}_n to \bar{O}_n	3.3 5.0	1.0 1.0	9.5 7.0	12.0 8.5	1.0 1.0	14.5 11.0	1.0 1.0	13.0 10.0	ns	3-6
t _{PHL}	Propagation Delay \bar{E}_n to \bar{O}_n	3.3 5.0	1.0 1.0	8.0 6.0	10.0 7.5	1.0 1.0	12.5 10.0	1.0 1.0	11.0 8.5	ns	3-6

*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.

5

AC139 • ACT139

AC Characteristics

Symbol	Parameter	V _{CC} * (V)	74ACT			54ACT		74ACT		Units	Fig. No.
			T _A = +25°C C _L = 50 pF			T _A = -55°C to +125°C C _L = 50 pF		T _A = -40°C to +85°C C _L = 50 pF			
			Min	Typ	Max	Min	Max	Min	Max		
t _{PLH}	Propagation Delay A _n to \bar{O}_n	5.0	1.0	6.0	8.5	1.0	12.0	1.0	9.5	ns	3-6
t _{PHL}	Propagation Delay A _n to \bar{O}_n	5.0	1.0	6.0	9.5	1.0	11.0	1.0	10.5	ns	3-6
t _{PLH}	Propagation Delay \bar{E}_n to \bar{O}_n	5.0	1.0	7.0	10.0	1.0	12.5	1.0	11.0	ns	3-6
t _{PHL}	Propagation Delay \bar{E}_n to \bar{O}_n	5.0	1.0	7.0	9.5	1.0	12.0	1.0	10.5	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	Units	Conditions
		Typ		
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = 5.5 V
C _{PD}	Power Dissipation Capacitance	40.0	pF	V _{CC} = 5.5 V